

# Discovering Computers **FUNDAMENTALS**

Your Interactive Guide to the Digital World



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# Discovering Computers

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Your Interactive Guide to the Digital World

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# Discovering Computers **FUNDAMENTALS**

Your Interactive Guide to the Digital World



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**Discovering Computers — Fundamentals:  
Your Interactive Guide to the Digital World**  
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Management Services: PreMediaGlobal  
Interior Designer: Joel Sadagursky  
Art Director: Marissa Falco  
Text Design: Joel Sadagursky  
Cover Design: Curio Press  
Cover Photos: Tom Kates Photography  
Illustrator: PreMediaGlobal  
Compositor: PreMediaGlobal  
Printer: RRD Menasha

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Library of Congress Control Number: 2010943268

ISBN-13: 978-1-1115-3045-7

ISBN-10: 1-1115-3045-9

**Course Technology**

20 Channel Center Street  
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Printed in the United States of America








1 2 3 4 5 6 17 16 15 14 13 12 11



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## Preface

The Shelly Cashman Series® offers the finest textbooks in computer education. This book is our answer to the many requests we have received from instructors and students for a textbook that provides a succinct, yet thorough, introduction to computers.

In *Discovering Computers — Fundamentals* you will find an educationally sound, highly visual, and easy-to-follow pedagogy that presents a complete, yet to the point, treatment of introductory computer subjects. With this edition we are introducing an interactive, multi-media e-book and CourseMate Web site that include animated figures, relevant video, and interactive activities in the e-book, making the learning experience engaging and interesting. Students will finish the course with a solid understanding of computers, how to use computers, and how to access information on the Web.

## Objectives of this Text, e-Book, and CourseMate Web Site

*Discovering Computers — Fundamentals: Your Interactive Guide to the Digital World* is intended for use as a stand-alone solution or in combination with an applications, Internet, or programming textbook in a full-semester introductory computer course. No experience with computers is assumed. The objectives of this offering are to:

- Provide a concise, yet comprehensive introduction to computers
- Present the most-up-to-date technology in an ever-changing discipline
- Give students an understanding of why computers are essential components in business and society
- Teach the fundamentals of computers and computer nomenclature, particularly with respect to personal computer hardware and software, the Web, and enterprise computing

## Hallmarks of Discovering Computers — Fundamentals

To date, more than six million students have learned about computers using a *Discovering Computers* textbook. With the Web integration and interactivity, streaming up-to-date audio and video, extraordinary step-by-step visual drawings and photographs, unparalleled currency, and the Shelly and Cashman touch, this offering will make your computer concepts course exciting and dynamic. Hallmarks of Shelly Cashman Series *Discovering Computers* include:

### A Proven Pedagogy

Careful explanations of complex concepts, educationally-sound elements, and reinforcement highlight this proven method of presentation.

### Essential Computer Concepts Coverage

This book offers the same breadth of topics as our well-known *Discovering Computers: Your Interactive Guide to the Digital World*, but the depth of coverage focuses on the basic knowledge required to be computer literate in today's digital world.

### A Visually Appealing Book that Maintains Student Interest

The latest technology, pictures, drawings, and text are combined artfully to produce a visually appealing and easy-to-understand book. Many of the figures include a step-by-step presentation (see page 111), which simplifies the more complex computer concepts. Pictures and drawings reflect the latest trends in computer technology.





- Present the material in a visually appealing, interactive, and exciting manner that motivates students to learn
- Present strategies for purchasing a desktop computer, notebook computer, a Tablet PC, and personal mobile devices
- Offer alternative learning techniques and reinforcement via the Web
- Offer distance-education providers a textbook with a meaningful and exercise-rich digital learning experience

## Distinguishing Features

*Discovering Computers — Fundamentals* includes a variety of compelling features, certain to engage and challenge students, making learning with *Discovering Computers — Fundamentals* an enriched experience. These compelling features include:

- Multi-media rich and interactive e-book and CourseMate Web site that engage students in learning about computer concepts.
- Animations, relevant and timely video, interactive in-chapter activities and Quiz Yourself reinforcement exercises embedded in the e-book, combined with the integration of interactive activities, videos, and end-of-chapter student assignments on the CourseMate Web site offer students an exceptional learning solution.
- Digital Communications special feature provides students with practical examples of collaborative and productive uses of digital communications.
- Exploring Computer Careers and Green Computing end-of-chapter student assignments challenge students to apply the concepts learned in the chapter.
- CNET At the Movies videos highlight current technology events of interest to students, involving them in the constant evolution of the computing world.
- Ethics and Issues, Looking Ahead, FAQ, Web Links, Companies on the Cutting Edge, and Technology Trailblazers include the most relevant and interesting examples to students.

## Latest Technologies and Terms

The technologies and terms your students see in this book are those they will encounter when they start using computers. Only the latest application software packages are shown throughout the book.

## Web Integrated

This book uses the Web as a major learning tool. The purpose of integrating the Web into the book is to (1) offer students additional information and currency on important topics; (2) use its interactive capabilities to offer creative reinforcement and online quizzes; (3) make available alternative learning techniques with Web-based learning games, practice tests, and interactive labs; (4) underscore the relevance of the Web as a basic information tool that

can be used in all facets of society; (5) introduce students to doing research on the Web; and (6) offer instructors the opportunity to organize and administer their traditional campus-based or distance-education-based courses on the Web using various learning management systems.

## Extensive End-of-Chapter Student Assignments

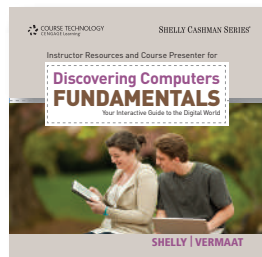
A notable strength of *Discovering Computers — Fundamentals* is the extensive student assignments and activities at the end of each chapter. Well-structured student assignments can make the difference between students merely participating in a class and students retaining the information they learn. The end-of-chapter student assignments include: Chapter Review, Key Terms, Checkpoint, Problem Solving, Learn How To, Learn It Online, and Web Research.

## Instructor Resources

The Instructor Resources include both teaching and testing aids.

**Instructor's Manual** Includes lecture notes summarizing the chapter sections, figures and boxed elements found in every chapter, teacher tips, classroom activities, lab activities, and quick quizzes in Microsoft Word files.

**Syllabus** Easily customizable sample syllabi that cover policies, assignments, exams, and other course information.



**Figure Files** Illustrations for every figure in the textbook in electronic form. Figures are provided both with and without callouts.

**Solutions to Exercises** Includes solutions for all end-of-chapter student assignments. Also includes Tip Sheets, which are suggested starting points for the Problem Solving exercises.

**PowerPoint Presentations — Course Presenter** A one-click-per-slide presentation system that provides PowerPoint slides for every subject in each chapter. Several computer-related video clips are available for optional presentation. Course Presenter provides consistent coverage for multiple lecturers.

**Test Bank & Test Engine** Test Banks include 112 questions for every chapter, featuring objective-based and critical thinking question types, and including page number references and figure references, when appropriate. Also included is the test engine, ExamView, the ultimate tool for your objective-based testing needs.

**Printed Test Bank** A Rich Text Format (.rtf) version of the test bank you can print.



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for any computer concepts text in the market today! The content in the CourseMate solution is integrated into each page of the text, giving students easy access to current information on important topics, reinforcement activities, and alternative learning techniques. Integrating the Computer Concepts CourseMate into the classroom keeps today's students engaged and involved in the learning experience.

The Computer Concepts CourseMate includes an integrated, multi-media rich and interactive digital book, and a variety of interactive Quizzes and Learning Games, Exercises, Web Links, Videos, and other features that specifically reinforce and build on the concepts presented in the chapter. These interactive activities are tracked within the CourseMate EngagementTracker, making it easy to assess students' retention of concepts. This digital solution encourages students to take learning into their own hands and explore related content on their own to learn even more about subjects in which they are especially interested.

All of these resources on the Computer Concepts CourseMate for *Discovering Computers — Fundamentals* enable students to get more comfortable using technology and help prepare students to use the Internet as a tool to enrich their lives.

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**Chapter Opener**

Before reading the chapter, carefully read through the Objectives to familiarize yourself with the material in each chapter.

**Initial Chapter Figure**

Carefully study the first figure in each chapter because it provides an easy-to-follow overview of the major purpose of the chapter.



Figure 6-1 A variety of storage options.

**Interactive e-Book Activity Icon**

Several elements in each chapter are interactive learning activities in the e-book and are identified by this icon.

**CourseMate Icon**

Visit the Computer Concepts CourseMate Web site for access to many of the interactive chapter elements.

**Web Links**

Obtain current information and a different perspective about key terms and concepts by visiting the Web Links found in the margins throughout the book.

240 Chapter 6 Storage

Capacity is the number of bytes (characters) a storage medium can hold. Figure 6-2 identifies the terms manufacturers use to define the capacity of storage media. For example, a reasonably priced USB flash drive can store up to 4 GB of data (approximately four billion bytes) and a typical hard disk has 120 GB (approximately 120 billion bytes) of storage capacity.

A **storage device** is the computer hardware that records and/or retrieves items to and from storage media. **Writing** is the process of transferring data, instructions, and information from memory to a storage medium. **Reading** is the process of transferring these items from a storage medium into memory. When storage devices write data on storage media, they are creating output. Similarly, when storage devices read from storage media, they function as a source of input. Nevertheless, they are categorized as storage devices, not as input or output devices.

The speed of storage devices is defined by access time. Access time measures the amount of time it takes a storage device to locate an item on a storage medium. The access time of storage devices is slow, compared with the access time of memory. Memory (chip) access time is measured in billions of a second (nanoseconds). Storage devices, by contrast, access items in thousands of a second (milliseconds) or millions of a second (microseconds).

Storage Term	Approximate Number of Bytes	Exact Number of Bytes
Kilobyte (KB)	1 thousand	2 <sup>10</sup> or 1,024
Megabyte (MB)	1 million	2 <sup>20</sup> or 1,048,576
Gigabyte (GB)	1 billion	2 <sup>30</sup> or 1,073,741,824
Terabyte (TB)	1 trillion	2 <sup>40</sup> or 1,099,511,627,776
Petabyte (PB)	1 quadrillion	2 <sup>50</sup> or 1,125,899,906,842,624
Exabyte (EB)	1 quintillion	2 <sup>60</sup> or 1,152,921,504,606,846,976
Zettabyte (ZB)	1 sextillion	2 <sup>70</sup> or 1,180,591,628,717,117,184,224
Yottabyte (YB)	1 septillion	2 <sup>80</sup> or 1,208,925,814,601,620,176,792,176

The capacity of a storage medium is measured by the number of bytes it can hold.

**Hard Disks**

A **hard disk** is a storage device that contains one or more inflexible, circular platters that use magnetic particles to store data, instructions, and information. The system unit on most desktop and notebook computers contains at least one hard disk. The entire device is enclosed in an airtight, solid case to protect it from contamination. A hard disk that is mounted inside the system unit sometimes is called a **fixed disk** because it is not portable (Figure 6-3). With respect to a storage medium, the term **portable** means you can remove the medium from one computer and carry it to another computer. Current personal computer hard disks have storage capacities from 160 GB to 2 TB and more. Home users store documents, spreadsheets, presentations, databases, e-mail messages, Web pages, digital photos, music, videos, and software on hard disks. Businesses use hard disks to store correspondence, reports, financial records, e-mail messages, customer orders and invoices, payroll records, inventory records, presentations, contracts, marketing literature, schedules, and Web sites.

Traditionally, hard disks record data using **longitudinal recording**, which aligned the magnetic particles horizontally around the surface of the disk. With **perpendicular recording**, by contrast, hard disks align the magnetic particles vertically or perpendicular to the disk's surface, making much greater storage capacities possible. Experts estimate that hard disks using perpendicular recording provide storage capacities about 10 times greater than disks that use longitudinal recording. Hard disks are **read/write** storage media. That is, you can read from and write on a hard disk any number of times. Read Editors & Issues 6-1 for a related discussion.

**Step Figures**

Each chapter includes numerous step figures that present the more complex computer concepts using a step-by-step pedagogy.

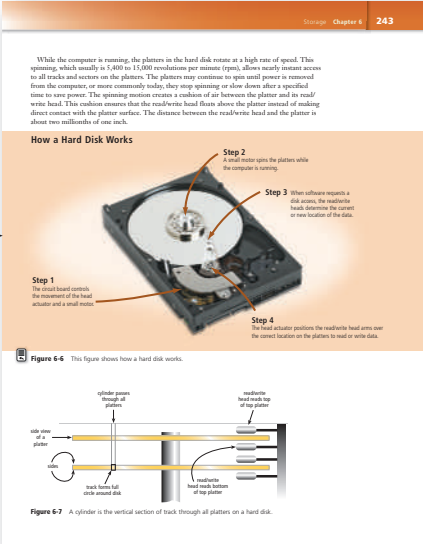


Figure 6-2 The capacity of a storage medium is measured by the number of bytes it can hold.

Figure 6-3 A slider is the vertical section of track through all platters on a hard disk.

## FAQs

FAQ (frequently asked questions) boxes offer common questions and answers about subjects related to the topic at hand.

## Ethics & Issues

Ethics & Issues boxes raise controversial, computer-related topics of the day, challenging readers to consider closely general concerns of computers in society.

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**Figure 6-28** Images on microfilm can be read only with a microfilm reader.

**Media Life Expectancies\***  
(when using high-quality media)

Media Type	Guaranteed Life Expectancy	Potential Life Expectancy
Magnetic disks	3 to 5 years	20 to 30 years
Optical discs	5 to 10 years	50 to 100 years
Solid state drives	50 years	140 years
Microfilm	100 years	500 years

\*According to manufacturers of the media.

**Figure 6-29** Microfilm is the medium with the longest life.

**Microfilm and Microfiche**  
Microfilm and microfiche store microscopic images of documents on roll or sheet film. **Microfilm** is a 100- to 215-foot roll of film. **Microfiche** is a small sheet of film, usually about 4 × 6 inches. A computer output microfilm recorder is the device that records the images on the film. The stored images are so small that you can read them only with a microfilm or microfiche reader (Figure 6-28).  
Microfilm and microfiche use is widespread, with many companies allowing you to search through and view microfilm images online. Libraries use these media to store back issues of newspapers, magazines, and genealogy records. Some large organizations use microfilm and microfiche to archive inactive files. Some banks use them to store transactions and canceled checks. The U.S. Army uses them to store personnel records.  
The use of microfilm and microfiche provides a number of advantages. They greatly reduce the amount of paper firms must handle. They are inexpensive and have the longest life of any storage media (Figure 6-29). Read Looking Ahead 6-1 for a look at long-term storage.

**LOOKING AHEAD 6-1**  
**Rosetta Project a Storage Solution**  
The Rosetta Stone unlocked the secret of understanding Egyptian hieroglyphics. Created in 186 B.C., the carved stone contains translations of one hieroglyphic passage into three languages. Today, more than 2,500 human languages exist, but 50 to 90 percent of them are expected to become extinct by the end of this century. In an effort to preserve these languages using long-term storage technology, thousands of people collaborated on the Rosetta Project to create the Rosetta Disk. Measuring only 3 inches wide, the nickel Rosetta Disk contains 15,000 etched pages documenting more than 1,000 known languages in the world. Each page is .019 inches wide, approximately the width of 5 human hairs. The pages are readable when the Disk is magnified 1,000 times. For protection, the Disk is housed in a 4-inch spherical container.  
Five prototype Disks were created. The original Disk is attached to the European Space Agency's Rosetta Space Probe that was launched in 2004 and is expected to land on a comet in 2014. The Probe will measure the comet's molecular composition and then orbit the sun for millions of years.  
For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Looking Ahead resource for this book, and then click Long-Term Storage.

**Enterprise Storage**  
A large business, commonly referred to as an enterprise, has hundreds or thousands of employees in offices across the country or around the world. Enterprises use computers and computer networks to manage and store huge volumes of data and information about customers, suppliers, and employees.  
To meet their large-scale needs, enterprises use special hardware geared for heavy use, maximum availability, and maximum efficiency. One or more servers on the network have the sole purpose of providing storage to connected users. For high-speed storage access, entire networks are dedicated exclusively to connecting devices that provide storage to other servers. In an enterprise, some storage systems can provide more than 185 TB of storage capacity. Optical disc servers hold hundreds of optical discs.

## Innovative Computing

Discover different and innovative ways of using various technologies and learn how computing is applied creatively to solve problems.

**Storage Chapter 6 241**

**Figure 6-3** The hard disk in a desktop computer is enclosed inside an airtight, sealed case inside the system unit. In this and other hard disk photos in the book, the top plate is removed from the hard disk for illustration purposes.

**FAQ 6-1**  
**To what degree are hard disk capacities increasing?**  
Hard disk capacities have increased at an exponential rate. Advancements in technology, such as perpendicular recording and enhanced read/write heads that can read and write denser areas on the platter, have resulted in a hard disk's capability of storing increasing amounts of data and information in a fixed amount of space. The chart to the right illustrates that the maximum hard disk size is growing.

For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 FAQ resource for this book, and then click Hard Disk Capacity.

**ETHICS & ISSUES 6-1**  
**Should the Government Require Hard Disks to Be Cleaned?**  
An IT professional recently purchased a hard disk on an auction Web site only to find private banking records of several million people. Fortunately, the purchaser notified authorities, rather than use the data for nefarious purposes. In other incidents, taxpayer data and secret police tactics appeared on hard disks purchased on auction Web sites, donated to charitable organizations, or recovered from discarded computers. Most people do not realize that deleting files from a computer does not render the data permanently inaccessible. Deleted files can be recovered easily by a smart criminal or digital forensics examiner.  
Experts recommend that special utility software, known as a wiping utility, be used to clean the contents of a hard disk before it leaves possession of the owner. The government sets various disk wiping standards. For example, one standard requires that the software wipe the drive seven times, while a more stringent standard requires fourteen. Experts also recommend the use of full disk encryption, which is the process of encoding data and information into an unreadable form. Others recommend that any hard disk that at any time contained sensitive information be destroyed by a service company that specializes in hard disk destruction. Some companies now offer a service that allows you to keep a hard disk if it falls while covered by a warranty. Typically, companies require that you return the damaged hard disk when you receive the replacement. Some people are not comfortable with this service, for fear of confidential information on the damaged hard disk falling into the wrong hands.  
Should the government require that hard disks on solid, donated, or discarded computers be cleaned, encrypted, or destroyed? Why or why not? Would you make an extra effort to clean or encrypt the contents of hard disks on sold, donated, or discarded computers? Why or why not?

## Looking Ahead

The Looking Ahead boxes offer a glimpse of the latest advances in computer technology that will be available, usually within five years.

**Storage Chapter 6 251**

**Cloud Storage**  
Some users choose cloud storage instead of storing data locally on a hard disk or other media. **Cloud storage** is an Internet service that provides hard disk storage to computer users (Figure 6-17).  
Types of services offered by cloud storage providers vary. Read Innovative Computing 6-1 to find out about another type of cloud storage.  
For arrangements vary. For example, one cloud storage service provides 25 GB of storage free to registered users; another charges \$5 per month for 150 GB of storage. For enterprises, cloud storage services typically charge for storage on a per gigabyte basis, such as 15 cents per gigabyte.

**Figure 6-17** An example of one Web site that provides cloud storage.

**INNOVATIVE COMPUTING 6-1**  
**Digital Books Are a Good Read**  
It is time to dust off your library card, because thousands of libraries are stocking their digital shelves with electronic books that you can download from anywhere you have computer access. Just locate a participating library's Web site, download the desired book files to your personal computer, and then transfer the files to your portable media player or smart phone. For patrons who do not want to download files, some libraries are lending a Playaway, which is a small device that stores 80 hours of digitized audio books.  
Another set of books is available for reading at the British Library's Online Gallery. Software called Turning the Pages allows readers to browse some of the rarest books in the world and magnify details on the pages. The books include the Gutenberg Bible, Lewis Carroll's original *Alice in Wonderland*, and *The Diamond Sutra*, the oldest book in existence, printed in China in 868 A.D.  
For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Innovative Computing resource for this book, and then click Online Libraries.

**Cloud Storage Providers**

Web Site Names	Type of Storage Provided	Other Services
Box.net, Drive, Windows Live SkyDrive	Backup or additional storage for any type of file	
Flickr, Picasa	Digital photos	Photo editing and photo management
YouTube	Digital videos	
Facebook, MySpace	Digital photos, digital videos, messages, and personal information	Social networking
Google Docs, Office Web Apps	Documents, spreadsheets, presentations	Productivity suite
Gmail, Windows Live Hotmail, Yahoo! Mail	E-mail messages	
Amazon EC2, Amazon S3, Netvix	Enterprise-level storage	Web services, data center services

**Figure 6-18** Some of the more widely used cloud storage providers.



## Quiz Yourself

Three Quiz Yourself boxes per chapter help ensure retention by reinforcing sections of the chapter material, rather than waiting for the end of chapter to test. Use Appendix A for a quick check of the answers, and access additional Quiz Yourself quizzes via the Computer Concepts CourseMate Web site for interactivity and easy use.

## Computer Usage @ Work

Learn about how computers are used in 12 different professional industries, including transportation, municipal services, education, sports, and construction.

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### QUIZ YOURSELF 6-3

Instructions: Find the true statement below. Then, rewrite the remaining false statements so that they are true.

1. A CD-RW is a type of optical disc on which users can read but not write (record) or erase.
2. A DVD-RAM is a single-session disc that stores digital versions of film using a .jpg file format.
3. DVDs have the same storage capacities as CDs.
4. Optical discs are written and read by mirrors.
5. Microfilm and microfiche have the shortest life of any media.

Quiz Yourself Online: To further check your knowledge of pages 252 through 259 visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Quiz Yourself resource for this book, and then click Objectives 5–7.

### Chapter Summary

Storage holds data, instructions, and information, which includes pictures, music, and videos, for future use. Users depend on storage devices to provide access to their storage media for years and decades to come.

This chapter identified and discussed various storage media and storage devices. Storage media covered included internal hard disks; external and removable hard disks; solid state drives; memory cards; USB flash drives; ExpressCard modules; cloud storage; CDs, DVDs, and Blu-ray Discs; tape; smart cards; and microfilm and microfiche.

### Computer Usage @ Work

#### Meteorology

With the television tuned to the local weather station, you anxiously are awaiting to see the projected path of a hurricane in the tropics. Having experienced hurricanes in the past, you rely heavily on the accuracy of weather forecasts so that you can adequately prepare if a storm travels through the area. Computers allow meteorologists to better estimate the severity and path of storms, enabling people to make potentially life-saving preparations.

The National Hurricane Center uses multiple computer models to determine a storm's path. These models consider factors such as the storm's current strength, the effects of nearby weather systems, the storm's central pressure, and whether the storm may travel over land. These models also may consider previous storms that traveled a similar path. Historical weather and storm data are stored on large storage devices by the National Weather Service. While these models are not 100 percent accurate, they do ensure that everyone who may be affected by the storm has enough time to prepare.

Violent, rotating thunderstorms potentially can spawn tornadoes, which sometimes cause catastrophic damage. For this reason, it is important for everyone to closely watch or listen to the weather during the storm. Meteorologists can monitor weather systems on multiple radars and send additional severe weather warnings automatically to weather radios. Computer technology enables these messages to be broadcast

automatically only to weather radios in areas that may be affected.

In addition to computers helping us stay safe during severe storms, they also assist with day-to-day weather forecasting. Several years ago, meteorologists could predict the weather for only a few days into the future. Beyond that point, the forecast was very uncertain. Meteorologists presently are able to predict the weather, including temperature and chance of precipitation, one week or more into the future with much greater accuracy because computers create models using historical weather data and behavior to predict the future path of various weather systems.

News and weather stations also post their weather forecasts online. In fact, several Web sites have interactive radars that allow visitors to zoom in and view how weather is affecting their immediate neighborhood.

The meteorology field has made significant advancements because of computer technologies. Weather forecasts are more meaningful, which not only helps us prepare on land but also helps to protect those traveling by air or by sea.

For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Computer Usage @ Work resource for this book, and then click Meteorology.



### Companies on the Cutting Edge

#### SEAGATE TECHNOLOGY Storage Solutions Supplier

The average household with a broadband Internet connection will need nearly 1 TB of storage for its personal media collections, and Seagate has the storage solutions for practically every digital need. The company offers more than 40 products for the personal computing, consumer electronics, and enterprise computing fields. Seagate has been at the forefront of the digital storage world since it developed the first 5.25-inch hard disk for the personal computer in 1980. In 2008 it shipped its one billionth hard disk, making the company's

production for the past 30 years a total of 79 million terabytes. Seagate expects to ship its two billionth hard disk by 2013. Seagate recently introduced the FreeAgent DockStar network adapter. This device allows users to access their digital media from anywhere in the world and share these files with anyone. The FreeAgent DockStar network adapter also enables users to link their digital content to online social networks such as Facebook, Twitter, and MySpace.



#### SANDISK CORPORATION Flash Memory Storage Supplier

The number of flash memory card formats is growing, and only one company has the rights to design, develop, manufacture, and market every one of them: SanDisk. The company is the world's largest supplier of flash memory storage products and also has lines of portable media players.

The company was founded in 1988, and one of its earliest flash drives was used on a U.S. space shuttle three years later. Today SanDisk is developing rewritable 3-D memory products that will store data vertically, and

company executives believe this technology will replace flash products in the next decade. SanDisk recently introduced the world's fastest 32 GB SDHC card. The 32 GB SanDisk Extreme SDHC card boasts read and write speeds of 30 megabytes per second. The increased speeds enable photographers to take pictures quickly without having to wait long for the card to record the images. In addition, computer users also are able to transfer data to and from the card quickly.



For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Companies on the Cutting Edge resource for this book.

### Technology Trailblazers

#### AL SHUGART Storage Expert

Al Shugart said that his real goal in life was to have fun, and he spent his life doing the things that gave him the most pleasure. The day after receiving his bachelor's degree in engineering physics in 1951, he landed a job at IBM doing what he loved to do: fixing broken items and developing new technology. He was promoted to supervisor of the product development team that developed the first removable hard disk drive.

Shugart then left IBM, became vice president of Memorex, and then started Shugart Associates and

began developing floppy disks. In 1979 he founded Seagate Technology with a friend. As his company grew to become the world's largest hard disk manufacturer, he had fun placing his dog, Ernest, on the ballot for a Congressional seat.

Shugart served as president and CEO of Al Shugart International, a venture capital firm in California, until his death in 2006.



#### MARK DEAN IBM Inventor

Web 2.0 applications demand large, inexpensive storage, and Mark Dean is hard at work helping to meet this need. As vice president of IBM's Almaden Research Center lab in California, Dean is responsible for developing innovative products.

Dean joined IBM after graduating from Stanford University with a degree in electrical engineering. He led a team that developed the first CMOS microprocessor to operate at one gigahertz and has more than

40 patents or patents pending that are used in more than 40 million personal computers manufactured each year. Three of his patents are among the nine registered for the architecture of the original personal computer. Dean is the first African-American to be appointed to IBM Fellow, the company's highest level of technical merit. He also was inducted in the National Inventors Hall of Fame.



For more information, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Technology Trailblazers resource for this book.

## Companies on the Cutting Edge and Technology Trailblazers

Everyone who interacts with computers should be aware of the key computer-related companies and of the more famous leaders of the computer industry.



# End-of-Chapter Student Assignments

## Chapter Review

The Chapter Review section reinforces the main concepts presented in this chapter.

To listen to an audio version of this Chapter Review, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Chapter Review resource for this book.

- What Are the Characteristics of an Internal Hard Disk?** A hard disk is a storage device that contains one or more inflexible, circular platters that use magnetic particles to store data, instructions, and information. The system unit in most desktop and notebook computers contains at least one hard disk. **Capacity** is the number of bytes (characters) a storage medium can hold. Hard disk capacity is determined from whether it uses **longitudinal recording** or **perpendicular recording**, the number of platters it contains, and the composition of the magnetic coating on the platters. A platter is made of aluminum, glass, or ceramic and is coated with a material that allows items to be recorded magnetically on its surface. Each platter has two read/write heads, one for each side. The location of a read/write head often is referred to by its cylinder, which is the vertical section of a track that passes through all platters. Magnetic disks store data and instructions in tracks and sectors. A track is a narrow recording band that forms a full circle on the surface of the disk. The disk's storage locations consist of pie-shaped sectors, which break the tracks into small areas called sectors. While the computer is running, the platters rotate at 5,400 to 15,000 revolutions per minute (rpm), which allows nearly instant access to all tracks and sectors on the platters.
- What Is the Purpose of Network Attached Storage Devices, External and Removable Hard Disks, and Hard Disk Controllers?** A network attached storage (NAS) device is a server connected to a network with the sole purpose of providing storage. Any user or device connected to the network can access files on the NAS device. These devices often use a **RAID** (redundant array of independent disks) configuration. A group of two or more integrated hard disks is called a RAID. An **external hard disk** is a separate freestanding hard disk that connects with a cable to a USB or FireWire port on the system unit or communicates wirelessly. External hard disks have storage capacities up to 4 TB or more. A **removable hard disk** can be inserted or removed from a drive. Removable hard disks have storage capacities up to 1 TB. A **disk controller** consists of a special-purpose chip and electronic circuits that control the transfer of data, instructions, and information from a disk to and from the system bus and other components in the computer. A hard disk controller may be part of a hard disk on the motherboard, or it may be a separate adapter card inside the system unit. In addition to USB and FireWire, which can function as hard disk interfaces, four other types of hard disk interfaces for use in personal computers are SATA (Serial Advanced Technology Attachment), EIDE (Enhanced Integrated Drive Electronics), SCSI, and SAS (serial-attached SCSI).
- What Are the Various Types of Flash Memory Storage?** Flash memory chips are a type of **solid state media**, which means they consist entirely of electronic components and contain no moving parts. A **solid state drive (SSD)** is a storage device that uses flash memory to store data, instructions, and information. Although SSDs currently have a higher failure rate than hard disks and are more expensive, experts estimate that as the price of SSDs drops, increasingly more users will purchase computers and devices that contain this media. A **memory card** is a removable flash memory device that you insert and remove from a slot in a computer, mobile device, or card reader/writer. Common types of memory cards include **CompactFlash (CF)**, **Secure Digital (SD)**, **Secure Digital High Capacity (SDHC)**, **microSD**, **microSDHC**, **xD Picture Card**, **Memory Stick**, and **Memory Stick Micro (M2)**. A **USB flash drive** is a flash memory storage device that plugs in a USB port on a computer or mobile device. An **ExpressCard module** is a removable device that fits in an ExpressCard slot. ExpressCard modules add storage or other capabilities to a computer and commonly are used in notebook computers.
- What Is Cloud Storage, and What Are Its Advantages?** Cloud storage is an Internet service that provides storage for computer users. Types of services offered by cloud storage providers vary. Available for all sizes of users, with various degrees of storage services available for home and business users, cloud storage fees vary, depending on the user's storage requirements. Advantages include accessing files on the Internet from any computer or device with Internet access; storing large audio, video, and graphics files on the Internet instantaneously; allowing others to access their files on the Internet; viewing time-critical data and images immediately; storing off-site backups of data; and providing data center functions.

Visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Quiz Yourself resource for this book, and then click Objectives 1–2.

Visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Quiz Yourself resource for this book, and then click Objectives 3–4.

## Chapter Review

The Chapter Review section reinforces the main concepts presented in this chapter.

To listen to an audio version of this Chapter Review, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Chapter Review resource for this book.

- What Are the Characteristics of Optical Discs?** An optical disc is a type of storage media that consists of a flat, round, portable disc made of metal, plastic, and lacquer. These discs usually are 4.75 inches in diameter and less than one-twentieth of an inch thick. Optical discs primarily store software, data, digital photos, movies, and music. Songs are read only, which means users cannot write (save) on them; others are read/write, which allows users to save on the disc just as they save on a hard disk. Optical discs store items by using microscopic pits (indentations) and lands (flat areas). A high-powered laser light creates the pits, and a lower-powered laser light reads items by reflecting light through the bottom of the disc. The reflected light is converted into a series of bits the computer can process.
- What Are the Various Types of Optical Discs?** A CD-ROM is an optical disc that users can read but not write (record) or erase. A CD-R is a multisection disc on which users can write, but not erase. A CD-RW (compact disc-rewritable) is erasable and can be written on multiple times. An **archive disc** is used to store photos from a photo sharing community in the jpg file format. A **Picture CD** stores digital versions of files using a jpg file format. A **DVD-ROM** is a high-capacity disc which users can read but not write on or erase. A **Blu-ray Disc (BD)** currently has storage capacities of 100 GB. The **HD VMD** (Versatile Multilayer Disc) is a high-density format with a capacity of 40 GB or more. A mini-DVD that has grown in popularity is the UMD (Universal Media Disc), which works specifically with the PlayStation Portable handheld game console. Similarly, the mini Blu-ray Disc is used primarily in digital video recorders. DVD-R, DVD+R, BD-R formats can be written on once. **DVD-RW**, **DVD+RW**, and **DVD+RAM** are three competing high-capacity rewritable DVD formats. **BD-RE** is a high-capacity rewritable DVD format.
- How Are Tape, Magnetic Stripe Cards, Smart Cards, Microfilm and Microfiche, and Enterprise Storage Used?** Tape is a magnetically coated ribbon of plastic capable of storing large amounts of data and information at a low cost. A **tape drive** reads and writes data and information on tape. Business users utilize tape most often for long-term storage and backup. A **magnetic stripe card** is a credit card, entertainment card, bank card, or other similar card with a stripe that contains information identifying you and the card. A magnetic stripe card reader reads information stored on the stripe. A **smart card**, which is similar in size to a credit or ATM card, stores data on a thin microprocessor embedded in the card. Smart cards contain a processor and have input, process, output, and storage capabilities. **Microfilm** is a 100- to 215-foot roll of film. **Microfiche** is a small sheet of film, usually about 4 × 6 inches. Microfilm and microfiche greatly reduce the amount of paper firms must handle, are inexpensive, and have the longest life of any storage media. Enterprises use special hardware to meet their large-scale needs, including servers, entire networks, and optical disc servers. In an enterprise, some storage systems can provide more than 185 TB of storage capacity.

Visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 Quiz Yourself resource for this book, and then click Objectives 5–7.

## Key Terms

You should know each key term. The list below helps focus your study.

Visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Key Terms resource for this book.

access time (240)	DVD-RAM (256)	microfilm (258)	Secure Digital (SD) (248)
archive disc (255)	DVD-ROM (256)	microfilm (258)	Secure Digital High Capacity (SDHC) (248)
backup (244)	DVD-ROM drive (256)	microSD (248)	smart card (257)
BD-RE (256)	DVD-RW (256)	microSDHC (248)	solid state drive (SSD) (247)
Blu-ray Disc (256)	DVD-RW drive (256)	network attached storage (244)	solid state media (247)
burning (254)	ExpressCard module (250)	optical disc (252)	storage device (240)
capacity (240)	external hard disk (244)	perpendicular recording (240)	tape (257)
card reader/writer (249)	hard disk (240)	Picture CD (255)	tape drive (257)
CD-R (254)	HD VMD (256)	RAID (244)	USB flash drive (250)
CD-ROM (254)	LightScribe technology (253)	removable hard disk (244)	xD Picture Card (248)
CD-ROM drive (254)	longitudinal recording (240)	ripping (255)	
CD-RW (255)	magnetic stripe card (257)	secondary storage (239)	
CD-RW drive (255)	memory card (240)		
cloud storage (253)	Memory Stick (248)		
CompactFlash (CF) (248)	Memory Stick Micro (M2) (248)		
disk controller (246)			

## Chapter Review

Use the Chapter Review before taking an examination to ensure familiarity with the computer concepts presented. This section includes each objective, followed by a one- or two-paragraph summary.

## Key Terms

Before taking a test, use the Key Terms page as a checklist of terms to know. Visit the Computer Concepts CourseMate Web site for additional information on the Key Terms.

## Checkpoint

The Checkpoint exercises test your knowledge of the chapter concepts. The page number containing the answer appears in parentheses after each exercise.

To complete the Checkpoint exercises interactively, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Checkpoint resource for this book.

### Multiple Choice

Select the best answer.

- \_\_\_\_\_ measures the amount of time it takes a storage device to locate an item on a storage medium. (240)
  - Capacity
  - Access time
  - A storage medium
  - Reading
- A group of two or more integrated hard disks is called a \_\_\_\_\_. (244)
  - backup
  - platter
  - RAID
  - portable hard disk
- A \_\_\_\_\_ consists of a special-purpose chip and electronic circuits that control the transfer of data, instructions, and information from a disk to and from the system bus and other components in the computer. (246)
  - pocket hard drive
  - removable hard disk
  - magnetic disk
  - disk controller
- A \_\_\_\_\_ is a memory storage device that plugs in a USB port on a computer or mobile device. (250)
  - smart card
  - USB flash drive
  - UMD
  - Memory Stick
- Users subscribe to a cloud storage service to \_\_\_\_\_. (252)
  - access files from any computer that has Internet access
  - allow others to access their files
  - store off-site backups of data
  - all of the above
- \_\_\_\_\_ technology works with specially coated optical discs to etch labels directly on the disc. (253)
  - LightScribe
  - SATA
  - LightScribe
  - SCSI
- \_\_\_\_\_ storage requires sequential access. (257)
  - Hard disk
  - Tape
  - Memory card
  - DVD
- An \_\_\_\_\_ card is a credit card, entertainment card, bank card, or other similar card, with a stripe that contains information identifying you and the card. (257)
  - Secure Digital High Capacity
  - magnetic stripe
  - Secure Digital
  - microSDHC

### Matching

Match the terms with their definitions.

- backup (244)
- external hard disk (244)
- solid state media (247)
- solid state drive (247)
- card reader/writer (249)
- media which consist entirely of electronic components, such as integrated circuits, and contain no moving parts
- device that reads and writes data, instructions, and information stored on memory cards
- portable, large-capacity magnetic medium that can store from 100 MB to 750 MB of data
- duplicate of a file, program, or disk placed on a separate storage medium that you can use in case the original is lost, damaged, or destroyed
- a storage device that typically uses flash memory to store data, instructions, and information
- a separate freestanding hard disk that connects with a cable to a USB port or FireWire port on the system unit or communicates wirelessly

## Checkpoint

Use these multiple choice, true/false, matching, and short answer exercises to reinforce understanding of the topics presented in the chapter.

### Short Answer

Write a brief answer to each of the following questions.

- What is longitudinal recording? \_\_\_\_\_ What is the benefit of perpendicular recording over longitudinal recording? \_\_\_\_\_
- What is network attached storage? \_\_\_\_\_ How much hard disk storage can home and small business users add to their network with a NAS device? \_\_\_\_\_
- How is a single-session disc different from a multisection disc? \_\_\_\_\_ What is a CD-RW? \_\_\_\_\_
- Why do users use memory cards? \_\_\_\_\_ Name five types of memory cards and describe some of the characteristics of each card. \_\_\_\_\_
- What is one difference between microfilm and microfiche? \_\_\_\_\_ What are some uses of microfilm and microfiche? \_\_\_\_\_

## Learn How To

Apply the concepts in the chapter to every day life with these hands-on activities. Learn how the Learn How To activities fit into your life with relevant scenarios, visual demonstrations, and practice questions via the Computer Concepts CourseMate Web site.

### Learn How To

The Learn How To activities step you through fundamental technology skills when using a computer. The Learn How To exercises enable you to become more proficient with these skills.

- 1. Premium Activity: To relate this Learn How To activity to your everyday life, see a visual demonstration of the activity, and complete a short assessment, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Chapter 6 Learn How To resource for this book.

#### Learn How To 1: Maintain a Hard Disk

A computer's hard disk is used for the majority of storage requirements. It is important, therefore, to ensure that each hard disk on a computer is operating at peak efficiency, both to use the available storage space effectively and to make disk operations as fast as possible.

Two tasks that maximize disk operations are removing unused or unnecessary files and folders by using the Disk Cleanup utility program and consolidating files and folders into contiguous storage areas using the Disk Defragmenter utility program. Defragmenting allows your system to access stored files and folders more efficiently.

##### A. Cleanup Disk

To clean up the disk by removing any programs and data that are not required for the computer, complete the following steps:

1. Click the Start button on the Windows taskbar and then click Computer on the Start menu.
2. When the Computer window opens, right-click the hard disk icon for drive C (or any other hard disk you want to select) and then click Properties on the shortcut menu.
3. If necessary, click the General tab in the disk drive Properties dialog box to display the General sheet.
4. Click the Disk Cleanup button in the General sheet to display the Disk Cleanup Options dialog box.
5. The Disk Cleanup dialog box is displayed and contains a message that indicates the amount of space that can be freed up is being calculated.
6. After the calculation is complete, the Disk Cleanup dialog box specifies the amount of space that can be freed up and the files to delete, some of which are selected automatically (Figure 6-31). Select those items from which you wish to delete files.
7. Click the OK button in the Disk Cleanup dialog box.
8. A dialog box asks if you are sure you want to perform these actions. Click the Delete Files button. The Disk Cleanup dialog box illustrates the progress of the cleanup. When the cleanup is complete, the dialog box closes.

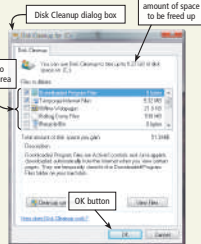


Figure 6-31

##### B. Defragment Disk

After removing all the unnecessary files from the hard disk, the next step in disk maintenance is to defragment all the files on the disk. When a file is stored on disk, the data in the file sometimes is stored contiguously, and other times is stored in a noncontiguous manner. The greater the amount of data on a disk, the more likely files will be stored noncontiguously. When a file is stored in a noncontiguous manner, it can take significantly longer to find and retrieve data from the file. One of the more useful utilities to speed up disk operations, therefore, is the defragmentation program, which combines all files so that no files are stored in a noncontiguous manner. To use the defragmentation program, complete the following steps:

1. If necessary, click the Tools tab in the Properties dialog box for the hard disk to be defragmented.
2. Click the Defragment now button in the Tools sheet to open the Disk Defragmenter window (Figure 6-32).
3. This window displays the Disk Defragmenter schedule, when Disk Defragmenter was run last, and when Disk Defragmenter is scheduled to run next.
4. Click the Defragment disk button. The defragmentation process begins. During the defragmentation process, the Stop operation button replaces the Defragment disk button. The defragmentation process can consume more than one hour in some cases, depending on the size of the hard disk and the amount of processing that must occur. You can cancel the operation at any time by clicking the Stop operation button in the Disk Defragmenter window.
5. When the process is complete, the Defragment disk button will replace the Stop operation button.
6. Click the Close button to close the Disk Defragmenter window.

Proper disk maintenance is critically important so that disk operation is as efficient as possible.

### Exercises

**Caution:** The exercises for this chapter that require actual disk maintenance are optional. If you are performing these exercises on a computer that is not your own, obtain explicit permission to complete these exercises. Keep in mind that these exercises can require significant computer time and the computer may be unusable during this time.

1. Display the Properties dialog box for a hard disk found on the computer. Display the General sheet. What is the capacity of the hard disk? How much space is used? How much free space is available? Click the Disk Cleanup button. How much space can be freed up if you use the Disk Cleanup program? Click the OK button to clean up the disk. How long did it take to perform the disk cleanup? Submit your answers to your instructor.
2. Display the Properties dialog box for a hard disk found on the computer. Display the Tools sheet. Click the Defragment now button. In the Disk Defragmenter window, click the Defragment disk button. How could you tell when the defragmentation process was completed? How long did defragmentation require? Submit your answers to your instructor.

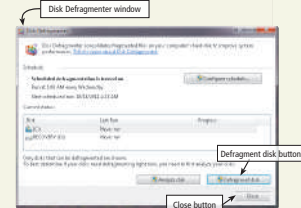


Figure 6-32

### Learn It Online

The Learn It Online exercises are interactive Web exercises designed to reinforce and expand your understanding of the chapter concepts. The descriptions below briefly summarize each exercise.

- 1. To complete the Learn It Online exercises, visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com), navigate to the Chapter 6 resources for this book, click the link for the exercise you want to complete, and then read the instructions.

#### 1. At the Movies — Thumb-drive (USB Flash Drive) Encryption

Watch a movie to learn how people who store personal and confidential information on USB flash drives can use third-party programs to password-protect the files so that others cannot access them and then answer questions about the movie.

#### 2. Student Edition Labs — Maintaining a Hard Drive (Hard Disk) and Managing Files and Folders

Enhance your understanding and knowledge about maintaining a hard disk and managing files and folders by completing the Maintaining a Hard Drive and Managing Files and Folders Labs.

#### 3. Practice Test

Take a multiple choice test that checks your knowledge of the chapter concepts and review the resulting study guide.

#### 4. Who Wants To Be a Computer Genius??

Play the Shelly Cashman Series version of this popular game by answering questions to find out if you are a computer genius. Panic buttons are available to provide assistance during game play.

#### 5. Crossword Puzzle Challenge

Complete an interactive crossword puzzle to reinforce concepts presented in this chapter.

#### 6. Windows Exercises

Step through the Windows 7 exercises to learn about the Recycle Bin, working with files, the hard disk, and Disk Cleanup.

#### 7. Exploring Computer Careers

Read about a career as a computer technician, search for related employment advertisements, and then answer related questions.

#### 8. Web Apps — TurboTax Online

Learn how to use TurboTax Online to create an account, start a new tax return from scratch, review your tax return, and then print and file your tax return.



## Learn It Online

The Learn It Online exercises, which include At the Movies online CNET videos, practice tests, interactive labs, learning games, and Web-based activities, offer a wealth of online reinforcement.

Storage Chapter 6 265

### Problem Solving

The Problem Solving exercises extend your knowledge of the chapter concepts by seeking solutions to practical computer problems that you may encounter at home, school, or work. The Collaboration exercise should be completed with a team.

In the real world, practical problems often can be solved in multiple ways. Provide one solution to each of the following problems using available resources, such as articles on the Web or in print, blogs, podcasts, videos, television, user guides, other individuals, and electronics and computer stores. You may need to use multiple resources to obtain an answer. Present your solutions in the form requested by your instructor (brief report, presentation, discussion, or other means).

#### @ Home

- 1. Old Movies** During the past two decades, you have been recording home movies on VHS tapes. It is becoming more difficult to locate blank VHS tapes, and you are worried that if your current VCR breaks, it will be hard to find a store that sells them new. A friend suggests that you copy these movies to an optical disc. What steps will you take to convert these movies?
- 2. Possible Head Crash** When you turn on your computer, you hear a clicking sound coming from inside the computer. Furthermore, you realize that Windows is not starting automatically. You talk to a friend who said that your hard disk might have experienced a head crash. What might have caused this?
- 3. Missing Cable** You are attempting to install a new 1 TB hard disk in your computer. You have found the empty bay for the new hard disk, but you cannot locate the cable that connects it to the computer. What are your next steps?
- 4. Memory Card Problems** For the past two years, you have been using the same Secure Digital (SD) memory card to take pictures with your digital camera. When you insert the SD memory card in your computer's card reader to transfer the pictures, your computer does not display the contents of the card. When you put the card back into your digital camera, you can see that the pictures still are stored on the card. What might be wrong?



#### @ Work

- 5. Disk Not Recognized** The information technology manager at your company has purchased external hard disks for employees to use to back up their files. When you connect the external hard disk to the USB port on your computer, the computer displays a message stating that it cannot recognize the device. What might you do to correct this problem?
- 6. File Will Not Open** Your computer is unable to open a file on an optical disc that you just inserted into the optical disc drive. You have been able to access other files on the same disc, but one file in particular is not opening. What might be causing this?
- 7. Backing Up Data** It has been several years since your office computer was upgraded, and you just received an e-mail message stating that you finally will receive a new computer next week. The e-mail message also stated that all employees will be responsible for backing up their data. What files will you back up?
- 8. Optical Disc Problem** Your colleague gives you an optical disc containing some video files. When you insert the disc in your computer, the disc burning software asks if you would like to finalize the disc. How will you respond?

#### Collaboration

- 9. Computers in Meteorology** Your environmental sciences instructor is teaching a lesson about how computers advanced the meteorology field. Form a team of three people to prepare a brief report about how computers and meteorology are connected. One team member should research how meteorologists predicted weather patterns before computers became mainstream. Another team member should create a timeline illustrating when and how computers were introduced to the meteorology field, and the third team member should research the types of computer hardware and software required for a typical news station to forecast and present the weather.

## Problem Solving and Collaboration

Tackle everyday computer problems and put the information presented in each chapter to practical use with the Problem Solving @ Home and Problem Solving @ Work exercises. Work as a team to solve the Collaboration exercise.

## Web Research

Each Web Research exercise requires follow-up research on the Web and suggests writing a short article or presenting the findings of the research to the class.

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### Web Research

The Web Research exercises broaden your understanding of chapter concepts by presenting questions that require you to search the Web for answers.

- 1. Search Sleuth**  
Use one of the search engines listed in Figure 2-8 in Chapter 2 on page 65 or your own favorite search engine to find the answers to the following questions. Copy and paste the Web address from the Web page where you found the answer. Some questions may have more than one answer. If required, submit your answers to your instructor.  
(1) What album did Hillsong United release in 2008 on a flash drive embedded in a rubber wristband? (2) What country uses the MyKad smart card for national identification? (3) What product did HTP develop in 2004 based on the efforts of engineer Daryl Anderson? (4) What products are available for sale at the SanDisk Plaza? (5) For what storage medium are phase change alloys used? (6) What company introduced using a hard disk for accounting projects in 1956?
- 2. Green Computing**  
Data storage is doubling every 18 months according to some computer industry experts, and consumers and businesses are turning to environmentally sound methods of backing up and storing files. Accessing hard disks consumes 80 percent of a storage system's electrical consumption, so companies have developed products that reduce a system's energy usage. Businesses invest in cooling systems that dissipate the heat generated when servers and storage hardware operate. Locate Web sites that describe these products and how they operate efficiently to conserve energy. How much energy savings do they claim to make in one year? To what extent are carbon dioxide and other greenhouse gases reduced? How do they maximize the use of power and cooling resources? Review your search results and then write a 50-word summary of your findings.
- 3. Social Networking**  
Privacy on social networking Web sites such as MySpace and Facebook is an international concern, and the Electronic Privacy Information Center ([epic.org/privacy/socialnet](http://epic.org/privacy/socialnet)) features news, policies, and resources discussing safeguarding and controlling personal information. At least one-fourth of hiring managers admit to researching job applicants' "digital dirt" by searching social networks and blogs, and some employers search social networking Web sites for profiles of current employees. Visit the Reputation Defender ([reputationdefender.com](http://reputationdefender.com)) and Defend My Name ([defendmyname.com](http://defendmyname.com)) Web sites and read about the services offered. Then view the standards posted on the MySpace and Facebook Web sites regarding privacy and allowable content. Summarize the information you read and viewed.
- 4. Blogs**  
Exercise and nutrition advice is available from experts who post firsthand experiences in their blogs. These authorities may be people who share a particular experience, such as losing weight or training for a marathon, or who have specialized training in the fitness field. For example, noted author Lou Schuler discusses nutrition, weight training, and issues of particular interest to men ([malepatternfitness.com](http://malepatternfitness.com)). Other popular fitness blogs are featured by The Families.com ([fitness.families.com/blog](http://fitness.families.com/blog)) and Diet-Blog ([diet-blog.com](http://diet-blog.com)). Athlete Blog Central ([yardbarker.com/athletes](http://yardbarker.com/athletes)) lists blogs that professional and amateur athletes and their fans write. Visit these sites and read the posts. Which stories received more than 25 comments? Which food, exercises, and programs are featured?
- 5. Ethics in Action**  
The United States Federal Bureau of Investigation used a controversial program until January 2005 to monitor and store the e-mail and Internet activity of suspected criminals. Originally called Carnivore, the surveillance program was renamed DCS1000. The program was designed to track the activities of potential terrorists, spies, drug traffickers, and organized crime ring members. FBI agents needed to obtain a court order to monitor an individual, but privacy advocates claim the software tracked people not covered under the court order. View online sites that provide information about DCS1000 or Carnivore, including HowStuffWorks ([howstuffworks.com/carnivore.htm](http://howstuffworks.com/carnivore.htm)). What commercial software has replaced Carnivore? Write a report summarizing your findings, and include a table of links to Web sites that provide additional details.





## Special Features

Six special features following Chapters 1, 2, 3, 5, 7, and 12 encompass topics from the history of computers, to hot topics on the Web 2.0, to a buyer's guide, to the latest in new technology and digital communications.

### Special Feature

## Digital Video Technology

Everywhere you look, people are capturing moments they want to remember. They shoot movies of their vacations, birthday parties, activities, accomplishments, sporting events, weddings, and more. Because of the popularity of digital video cameras and mobile devices with built-in digital cameras, increasingly more people desire to capture their memories digitally, instead of on film. As shown in Figure 1, people have the ability to modify and share the digital videos they create. When you use special hardware and/or software, you can copy, manipulate, and distribute digital videos using your personal computer and the Internet. Amateurs can

or memory card. Unlike film, storage media can be reused, which reduces costs, saves time, and provides immediate results. Digital technology allows greater control over the creative process, both while recording video and in the editing process. You can check results immediately after capturing a video to determine whether it meets your expectations. If you are dissatisfied with a video, you can erase it and recapture it, again and again. Today, many mobile devices, such as smart phones and PDAs, allow you to capture videos. As shown in Figure 1, digital video cameras, and mobile

### Special Feature

## Making Use of the Web

INFORMATION LITERACY IS DEFINED as having the practical skills needed to evaluate information critically from print and electronic resources and to use this information accurately in daily life. Locating Web sites may be profitable for your educational and professional careers, as the resources may help you research class assignments and make your life more fulfilling and manageable.

Because the Web does not have an organizational structure to assist you in locating reliable material, you may need additional resources to guide you in searching. To help you find useful Web sites, this Special Feature describes specific areas of Web addresses of interest. This feature also describes specific areas of interest. This feature also describes specific areas of interest. This feature also describes specific areas of interest.

### Special Feature

## Digital Communications

DIGITAL COMMUNICATIONS, which factor largely in many people's personal and business lives, include any transmission of information from one computer or mobile device to another (Figure 1). This feature covers many forms of digital communications: e-mail; text messaging; instant messaging; and picture/video messaging; digital voice communications; blogs and wikis; online social networks, chat rooms, and Web conferences; and content sharing.

### Special Feature

## Buyer's Guide: How to Purchase Computers and Mobile Devices

AT SOME POINT, perhaps while you are taking this course, you may decide to buy a computer or mobile device (Figure 1). The decision is an important one and will require an investment of both time and money. Like many buyers, you may have little experience with technology and find yourself unsure of how to proceed. You can start by talking to your friends, coworkers, and instructors about their computers and mobile devices. What type of computers and mobile devices did they buy? Why? For what purposes do they use their computers and mobile devices?



Figure 1 Computers and mobile devices

### Special Feature

## Timeline

### Milestones in Computer History

Visit the Computer Concepts CourseMate Web site at [www.cengagebrain.com](http://www.cengagebrain.com) and then navigate to the Timeline Feature resource for this book.

**1937** Dr. John V. Atanasoff and Clifford Berry design and build the first electronic digital computer. Their machine, the Atanasoff-Berry Computer, or ABC, provides the foundation for advances in electronic digital computers.

**1945** John von Neumann poses in front of the electronic computer built at the Institute for Advanced Study. This computer and its von Neumann architecture served as the prototype for subsequent stored program computers worldwide.

**1947** William Shockley, John Bardeen, and Walter Brattain invent the transistor. The transistor would revolutionize computers, proving much more reliable than vacuum tubes.

**1946** Dr. John W. Mauchly and J. Presper Eckert, Jr. complete work on the first large-scale electronic, general-purpose digital computer.

### Special Feature

## Living Digitally

OUR DIGITAL LIVES are filled with a variety of products. We listen on portable media players to audio files we create or download. We record and view video content that matches our viewing interests. We play recorded files wherever and whenever we desire. We play games solo or with multiple friends across the globe. Our home networks link security, energy monitoring, and leisure activities throughout the house. Wherever we go in our lives, technology is a pervasive part of our daily existence.



- Digital products in our lives often include features that overlap in various entertainment and home automation categories.
- Audio
- Video
- Recording
- Gaming
- Digital Home



- Audio
- Video
- Recording
- Gaming
- Digital Home

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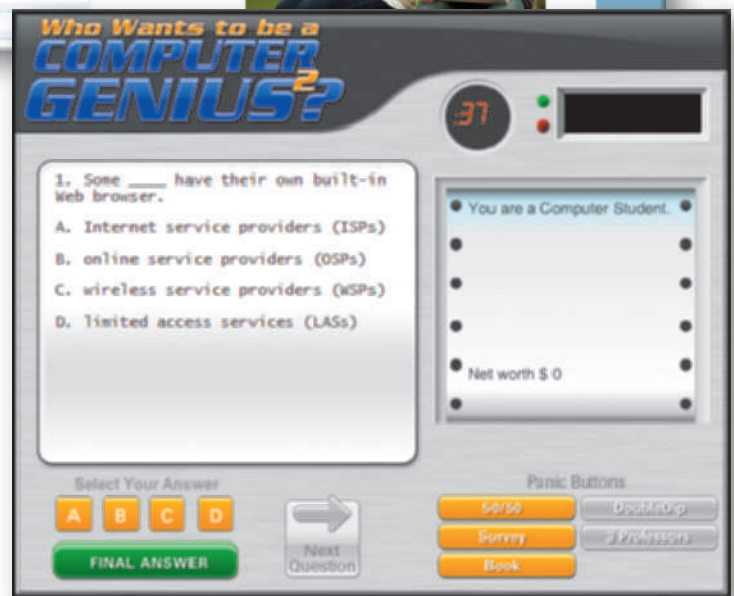
## Visual Walkthrough of the Computer Concepts CourseMate for Discovering Computers — Fundamentals

### Interactive. Current. Engaging. Your Interactive Guide to the Digital World!

Introduce the most current technology into the classroom with the Computer Concepts CourseMate for Discovering Computers — Fundamentals. An integrated ebook and a wide range of online learning games, quizzes, practice tests, videos, and Web links expand on the topics covered in the text with hands-on reinforcement. The Pointer Icon integrated into each page of the text illustrates when to access the CourseMate Web site and quickly shows students the connection between the text and the digital solution.

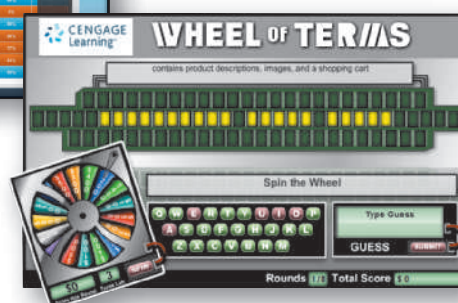
#### Who Wants to Be a Computer Genius?<sup>2</sup>

The Who Wants to Be a Computer Genius?<sup>2</sup> learning game allows students to quiz themselves on chapter content within a dynamic and entertaining game scenario. Question results are provided instantly so that students quickly see which concepts they understand and which concepts they need to study. Page remediation is included with question results so students know exactly where in the text to find the information they need.



#### EngagementTracker

EngagementTracker makes assessing students easy by tracking student progress on the interactive activities. Clear and visual reports illustrate the class progress as a whole.



#### Wheel of Terms

Wheel of Terms is an interactive study tool for learning the Key Terms in each chapter. This learning game presents students with a short definition of one of the chapter's Key Terms and prompts them to type the correct term as the answer.

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- 802.11i:** Network standard that conforms to government's security standards and uses more sophisticated encryption techniques than WPA. Sometimes called WPA2. **397, 410**
- 802.16:** Worldwide Interoperability for Microwave Access. Newer network standard developed by IEEE that specifies how wireless devices communicate over the air in a wide area. **330. See also WiMAX**
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- Adware remover:** Program that detects and deletes adware from a user's computer. **289, 295**
- Air mouse:** Newer type of motion-sensing mouse that, in addition to the typical buttons, allows you to control objects, media players, and slide shows by moving the mouse in predetermined directions through the air. **191, 224**
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- Americans with Disabilities Act (ADA):** Federal law that requires any company with 15 or more employees to make reasonable attempts to accommodate the needs of physically challenged workers. **220**
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- Analysis phase:** Step in system development that consists of two major activities: (1) conduct a preliminary investigation, and (2) perform detailed analysis. **425, 456**
- Animation:** Appearance of motion created by displaying a series of still images in sequence. **71, 84**
- ANSI network standards, **328**
- Anti-spam program:** Program that attempts to remove spam before it reaches a user's inbox. **289, 295, 405**
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Component of a processor that performs arithmetic, comparison, and other operations. 159, 160, 180

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**Artificial intelligence (AI):** The application of human intelligence to computers. 476

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Programming language in which a programmer writes instructions using symbolic instruction codes. 437

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**ATM:** Asynchronous Transfer

Mode; service that carries voice, data, video, and multimedia at very high speeds. 332, 344

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**ATOM:** XML application that content aggregators use to distribute content to subscribers. 447

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**Attribute:** Each data element in an object. 368, 375

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auctions Web sites, 100

**Audio:** Music, speech, or any other sound. 72, 84, 502

**Audio editing software:**

Application software that allows a user to modify audio clips, produce studio-quality soundtracks, and add audio to video clips. 120, 122, 123, 134

**Audio input:** Process of entering any sound, such as speech, music, and sound effects, into the computer. 198

**Audio output device:**

Component of a computer that produces music, speech, or other sounds, such as beeps. 217, 225

**Audit trail:** Computer file that records both successful and unsuccessful access attempts. 389, 410

**Automated teller machine**

**(ATM):** Special-purpose terminal, connected to a host computer through a network that functions as a self-service banking machine. 204

**Automatic update:** Operating system feature that automatically provides updates to a program. 277, 294

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Automobile X prize, 455

**B**

**Back door:** Program or set of instructions in a program that allow users to bypass security controls when accessing a program, computer, or network. 388, 410

**Back up:** To make a copy of a file. 396

files on offsite Internet server, 414–415

background, and active programs, 274

**Backside bus:** Bus that connects the processor to cache. 174, 181

**Backup:** Duplicate or copy of a file, program, or disk placed on a separate storage medium that can be used if the original is lost, damaged, or destroyed. 244, 367, 374, 396

procedures, 490–492

**Backup utility:** Utility program that allows users to copy, or back up, selected files or an entire hard disk to another storage medium, such as another hard disk, optical disc, USB flash drive, or tape. 286, 295

Backus, John, 38

**Bandwidth:** The amount of data, instructions, and information that can travel over a communications channel. 337

banking, online, 25, 124

**Bar code:** Identification code consisting either of vertical lines and spaces of different widths or a two-dimensional pattern of dots, squares, and other images that represent a manufacturer and an item. 201

**Bar code reader:** Optical reader that uses laser beams to read bar codes by using light patterns that pass through the bar code lines. 189, 201, 224

barcode of life (DNA sequencing), 365

Bardeen, John, 37

Baseball Boss, 359

BASIC computer language, 39

batch processing, 473

batteries, UPS, 396

**Bay:** Opening inside the system unit in which additional equipment can be installed. 175

BD-R, 253

**BD-RE:** High-capacity rewritable DVD format. 256, 263

BD-ROM, 253

BehaviorIQ, 402

**Benchmark test:** Test that measures the performance of hardware or software. 430

bendable notebook computers, 173

Berners-Lee, Tim, 42, 61, 83

Berry, Clifford, 37

Bezos, Jeff, 29

**Binary system:** Number system used by computers that has just two unique digits, 0 and 1, called bits. 162, 180

Bing Maps, 96

Bing Web site, 93

**Biometric device:** Device that authenticates a person's identity by translating a personal characteristic, such as a finger print, into a digital code that then is compared with a digital code stored in a computer verifying a physical or behavioral characteristic. 188, 391, 410

**Biometric payment:** Payment method where the customer's fingerprint is read by a fingerprint reader that is linked to a payment method such as a checking account or credit card. 391

**Biometrics:** Technology of authenticating a person's identity by verifying a personal characteristic. 202

**Bit:** The smallest unit of data a computer can process. Bit is short for binary digit. 162, 163, 180

BlackBerry, 283, 293

**Blade server:** Complete computer server, such as a Web server or network server, packed on a single card. 489, 495

**Blog:** Informal Web site consisting of time-stamped articles, or posts, in a diary or journal format, usually listed in reverse chronological order. 10, 49, 68, 84, 316

creating and using, 34

personal and business perspectives on, 148–149

blogging software, 130

**Blogsphere:** Worldwide collection of blogs. 68, 94

blogs Web sites, 94

**Bluetooth:** Network standard, specifically a protocol, that defines how two Bluetooth devices use short-range radio waves to transmit data. 172, 181, 329, 505

hot spots, 318

**Blu-ray Disc:** Newer, expensive type of DVD with storage capacities of 100 GB, and expectations of exceeding 200 GB in the future. 51, 256, 263

Blu-ray Disc recorders, 232

body area networks (BANs), 323

**Bookmark:** Saved Web address that you access by clicking its name in a list. 63. *See also Favorite*

books Web sites, 100

**Bootling:** Process of starting or restarting a computer. 272

**Botnet:** Group of compromised computers connected to a network such as the Internet that is used as part of a network that attacks other networks, usually for nefarious purposes. 387, 410

safeguards against, 388–389

brain wave forensics, 392

Brattain, Walter, 37

Bricklin, Dan, 40, 133

Brin, Sergey, 83

British Museum's Online Gallery Software, 251

**Broadband:** High-speed Internet connection provided through cable, DSL, fiber, radio signals, or satellite. 57, 84, 305, 338, 506

- Broadcast radio:** Wireless transmission medium that distributes radio signals through the air over long distances such as between cities, regions, and countries and short distances such as within an office or home. **341**, **345**
- Browser:** Application software that allows users to access and view Web pages. **61**, **84**. *See also Web browser*
- Buffer:** Segment of memory or storage in which items are placed while waiting to be transferred from an input device or to an output device. **275**
- Burning:** Process of writing on an optical disc. **254**  
files to optical disc, **298**  
music, video, **504**
- Burns, Ursula**, **223**
- Bus:** Electrical channel that transfers electronic bits internally within the circuitry of a computer, allowing the devices both inside and attached to the system unit to communicate with each other. **174**, **181**
- Bus network:** Type of network topology in which a single central cable connects all computers and other devices. **327**
- Business intelligence (BI):**  
Several types of applications and technologies for acquiring, storing, analyzing, and providing access to information to help users make more sound business decisions. **468**, **494**
- Business process automation (BPA):** Automation that provides easy exchange of information among business applications, reduces the need for human intervention in processes, and uses software to automate processes wherever possible. **468**, **494**
- Business process management (BPM):** Set of activities that enterprises perform to optimize their business processes, such as accounting and finance, hiring employees, and purchasing goods and services. **468**, **494**
- Business software:** Application software that assists people in becoming more effective and efficient while performing their daily business activities. **112**, **134**  
types of, **108**, **112–119**  
business software suite, **112**  
business/marketing Web sites, **68**  
business-to-business (B2B)  
  e-commerce, **74**, **481**  
business-to-consumer (B2C)  
  e-commerce, **74**
- Button:** Graphical element that is activated to cause a specific action to take place. **110**, **134**
- buying guide**  
to desktop computers, **302–306**  
to digital cameras, **311–312**  
to notebook computers, **306–309**  
to portable media players, **310–311**  
to smart phones, **309–310**
- Byte:** Eight bits that are grouped together as a unit. A byte provides enough different combinations of 0s and 1s to represent 256 individual characters. **162**, **164**, **180**
- C**
- C:** Programming language developed in the early 1970s at Bell Laboratories used for business and scientific applications. **439**
- C#:** Object-oriented programming language based on C++ developed primarily by Anders Hejlsberg at Microsoft. **441**, **456**
- C++:** Object-oriented programming language developed at Bell Laboratories that is an extension of the C programming language. **427**, **441**, **456**
- Cable Internet service:** High-speed Internet access provided through the cable television network via a cable modem. **57**, **84**, **334**
- Cable modem:** Digital modem that sends and receives digital data over the cable television (CATV) network. **59**, **333**, **345**
- cable television (CATV) network**, **339**
- cable types**, **339–340**
- cables**  
printer, **212**  
S-video, **233**
- Cache:** Area of memory that stores the contents of frequently used data or instructions. **167**  
calculations by spreadsheets, **115**  
Calibri, Cambria fonts, **114**
- Camera phone:** Phone that can send picture messages. **17**
- camera pills**, **26**
- cameras, digital**. *See Digital camera*
- Capacity:** Number of bytes a storage medium can hold. **240**, **241**, **262**
- CAPTCHA:** Completely Automated Public Turing test to tell Computers and Humans Apart; program used by some Web sites to provide further protection for a user's password by verifying that user input is not computer generated. **390**
- capturing video**, **504**
- Card reader/writer:** Device that reads and writes data, instructions, and information stored on PC Cards or flash memory cards and transmits that data to a computer or printer through a connection to a port. **5**, **248**, **249**, **303**
- career Web sites**, **105**
- Carnivore e-mail surveillance program**, **268**
- carpal tunnel syndrome (CTS)**, **398**
- cartography Web sites**, **96**
- Case control structure:** Type of selection control structure that can yield one of three or more possibilities. **452**
- Cathode-ray tube (CRT):**  
Large, sealed glass tube whose front, the screen, is coated with dots of red, green, and blue phosphor material. **210**
- CD-R:** Multisession optical disc on which users can write, but not erase, their own items such as text, graphics, and audio. **254**, **263**
- CD-ROM:** Type of optical disc that uses laser technology to store data, instructions, and information that users can read but not write on or erase. **254**, **263**
- CD-ROM drive:** Drive that can read CD-ROM discs and sometimes audio CDs. **254**
- CD-RW:** Erasable multisession optical disc on which users can write data, instructions, and information multiple times. **255**
- CD-RW drive:** Drive that can read audio CDs, standard CD-ROMs, CD-Rs, CD-RWs, and can write on, or record, CD-RWs. **255**, **263**
- cell phones**  
digital voice communications, **146–147**  
radiation from, **340**  
use as primary telephone, **316**
- cellular antenna radiation**, **340**
- Cellular radio:** Form of broadcast radio that is used widely for mobile communications, specifically wireless modems and cellular telephones. **341**
- Cellular radio network:** High-speed Internet connection for devices with built-in compatible technology or computers with wireless modems. **58**, **84**, **345**
- Central processing unit (CPU):**  
Electronic component on a computer's motherboard that interprets and carries out the basic instructions that operate the computer. **159**, **180**. *See also Processor*
- Certificate authority:**  
Authorized person or company that issues and verifies digital certificates. **395–396**, **410**
- Change management:** Skill required for project leaders so they can recognize when a change in a project has occurred, take actions to react to the change, and plan for opportunities because of the change. **420**
- Character:** A number, letter, punctuation mark, or other symbol that is represented by a single byte in the ASCII and EBCDIC coding schemes. **355**, **374**
- charting with spreadsheets**, **116**
- Chat:** Real-time typed conversation that takes place on a computer. **79**
- Chat room:** Location on an Internet server that permits users to chat with each other. **79**, **130**, **316**  
personal and business perspectives on, **150–151**
- Check digit:** Validity check consisting of a number(s) or character(s) that is appended to or inserted in a primary key value. **360**, **374**
- Chess Titans**, **274**

**Chief information officer**

(CIO): IT executive position that reports to the CEO. 467, 471, 473

**Chief security officer:** Employee responsible for physical security of a company's property and people; in charge of security computing resources. 434

**Chip:** Small piece of semiconducting material, usually silicon, on which integrated circuits are etched. 158, 179

Cisco Systems, 343

city guides Web sites, 96

Clark, Jim, 43

cleaning

computers, mobile devices, 177

hard disks, 241

optical discs, 254

**Click:** To move the mouse pointer to a button or link on the computer screen, and then to press and release the left mouse button. 64, 110, 134

click stream, 481

**Click Wheel:** Touch-sensitive pad on a portable media player that users can rotate to browse through song, picture or movie lists or press the buttons to play or pause media, display a menu, and other actions. 193

**Clickjacking:** Scam in which an object that can be clicked on a Web site, such as a button, image, or link, contains a malicious program. 405

**Clients:** Other computers and mobile devices on a network that rely on a server for its resources. 325

**Client/server network:** Network in which one or more computers act as a server, and the other computers on the network request services from the server. 325

**Clip art:** Collection of drawings, photos, and other images that a user can insert in documents. 113

**Clip art/image gallery:** A collection of clip art and photos included with application software. 123, 126, 135

**Clock speed:** Pace of the system clock, measured by the number of ticks per second. 161, 174

closed source operating systems, 282

**Cloud computing:** Internet service that provides computing needs to computer users. 483–484, 494–495

**Cloud storage:** Internet service that provides storage to computer users. 239, 251–252, 262, 396

**CMOS:** Technology used by some RAM chips, flash memory chips, and other types of memory chips that provides high speeds and consumes little power by using battery power to retain information even when the power to a computer is off. 168, 180, 261

**Coaxial cable:** A single copper wire surrounded by at least three layers: (1) an insulating material, (2) a woven or braided metal, and (3) a plastic outer coating. 339, 345

**COBOL:** COmmon Business-Oriented Language. Programming language designed for business applications, which evolved out of a joint effort between the United States government, businesses, and major universities in the early 1960s. 38, 439, 440

**Code snippets:** Prewritten code and templates associated with common programming tasks. 442

codec, 233

**Cold boot:** Process of turning on a computer that has been powered off completely. 272

**Collaborate:** Work online with other users connected to a server. 321, 344

**Collaborative databases:** Type of Web database where users store and share photos, videos, recordings, and other personal media with other registered users. 370

**Collaborative software:** Software that includes tools that enable users to share documents via online meetings and communicate with other connected users. 321

color correction tools, 235

color laser printers, 214

**Column:** Term used by users of relational databases for field. 368, 375

**Command:** Instruction on a menu that causes a program to perform a specific action. 110

**Command-line interface:** Type of user interface in which a user types commands or presses special keys on the keyboard (such as function keys or key combinations) to enter data and instructions. 273, 294

**Communications:** Process in which two or more computers or devices transfer data, instructions, and information. 314, 344

application software for (fig.), 130

conducting effective interviews, 460–461

in the enterprise, 480

over telephone networks, 331–333

uses of, 315–322

using VoIP, 498–499

**Communications channel:** Transmission media on which data, instructions, or information travel. 314, 337–339, 344

**Communications device:** Any type of hardware capable of transmitting data, instructions, and information between a sending device and a receiving device. 30, 333, 344

types of, 333–335

**Communications satellite:** Space station that receives microwave signals from an earth-based station, amplifies (strengthens) the signals, and broadcasts the signals back over a wide area to any number of earth-based stations. 341, 345

**Communications software:** Programs that (1) help users establish a connection to another computer or network; (2) manage the transmission of data, instructions, and information; and (3) provide an interface for users to communicate with one another. 330–331, 344

Compac, Inc., 41

**CompactFlash (CF):** Type of miniature mobile storage medium that is a flash memory card capable of storing between 512 MB and 100 GB of data. 248, 249, 262

company/industry information

Web sites, 105

**Compiler:** Separate program that converts an entire source program into machine language before executing it. 438

**Completeness check:** Validity check that verifies that a required field contains data. 360, 374

**Composite key:** Primary key that consists of multiple fields. 356

compressing files, 138–139

**Computer:** Electronic device, operating under the control of instructions stored in its own memory, that can accept data, process the data according to specified rules, produce results, and store the results for future use. 3, 30

advantages and disadvantages of using, 7–8

agricultural uses of, 342

airport security screening, and

damage to media, 250

applications in society, 24–28

categories of, 14–16

cleaning, 177

construction industry usage, 132

educational usage of, 292

and entertainment industry, 82

examples of usage, 20–24

government search and seizure of, 176

health concerns with, 398–399

health sciences' use of, 372

and identify theft, 10

manufacturing usage of, 454

meteorology's use of, 260

municipal services usage, 492

networks. *see* networks

organizing, managing files on,

378–379

overview, 2–4

PCs vs. Apple computers, 15

recycling, 14

space exploration and, 222

sports industry usage, 178

starting, shutting down, 272

system software's role, 109–110

**Computer addiction:** Growing health problem that occurs when the computer consumes someone's entire social life. 399, 411

computer communications, 314–322

**Computer crime:** Any illegal act involving a computer. 382

**Computer ethics:** Moral guidelines that govern the use of computers and information systems. 399



- Computer literacy:** Having a current knowledge and understanding of computers and their uses. 3, 30, 91. *See also* **Digital literacy**
- Computer program:** Series of instructions that directs a computer to perform tasks. 435
- Computer security plan:** Written summary of all the safeguards that are in place to protect an organization's information assets. 434
- Computer security risk:** Any event or action that could cause a loss of or damage to computer hardware, software, data, information, or processing capability. 382  
types of, 382–383
- Computer vision syndrome:** Eyestrain due to prolonged computer usage. 398, 410–411
- Computer-aided design (CAD):** Software that aids in engineering, drafting, and design. 454, 471, 494
- Computer-aided design (CAD) software:** Sophisticated type of application software that assists a professional user in creating engineering, architectural, and scientific designs. 120, 121, 132, 134
- Computer-aided engineering (CAE):** Use of computers to test product designs. 471, 494
- Computer-aided manufacturing (CAM):** Use of computers to assist with manufacturing processes such as fabrication and assembly. 27, 454, 471, 494
- Computer-aided software engineering (CASE):** Software tools designed to support one or more activities of system development, typically including diagrams to support both process and object modeling. 432
- Computer-based training (CBT):** Type of education in which students learn by using and completing exercises with instructional software. 127, 131, 449
- Computer-integrated manufacturing (CIM):** Use of computers to integrate the many different operations of the manufacturing process. 471, 494  
conducting effective interviews, 460–461  
configurations, suggested minimum, by user (fig.), 176  
configuring devices, 276  
connecting  
to Internet, 57–58, 276  
mouse to computer, 192  
connections, Internet types and speeds (fig.), 332
- Connector:** Device that joins a cable to a port. 170–171, 181
- Consistency check:** Validity check that tests the data in two or more associated field to ensure that the relationship is logical and their data is in the correct format. 360, 374  
construction industry use of computers, 132  
consumer-to-consumer (C2C) e-commerce, 74–75  
contact lenses, monitoring glaucoma, 277
- Content aggregator:** Business that gathers and organizes Web content and then distributes, or feeds, the content to subscribers for free or a fee. 70, 84
- Content filtering:** Process of restricting access to certain material on the Web. 407, 411
- Content management system (CMS):** An information system that is a combination of databases, software, and procedures that organizes and allows access to various forms of documents and other files, including images and multimedia content. 478, 494  
content sharing, personal and business perspectives on, 152–153
- Continuous backup:** Backup plan in which all data is backed up whenever a change is made. 367, 374, 490  
continuous backup protection (CBP), 490  
continuous data protection (CDP), 490, 491, 495  
contrast ratio, 209
- Control structure:** Used during program design, a depiction of the logical order of program instructions. 451, 457  
types of, 451–453
- Control unit:** Component of a processor that directs and coordinates most of the operations in the computer. 159, 180
- Convergence:** Term used to refer to the trend of manufacturers offering computers and devices with technologies that overlap. 14
- Cookie:** Small text file that a Web server stores on a computer. 403–404, 411  
cooking Web sites, 102  
copyleft, 409
- Copyright:** Exclusive rights given to authors and artists to duplicate, publish, and sell their materials. 401  
corporate blogs, 94  
Cowlshaw, Mike, 448
- CPU (central processing unit):** Electronic component on a computer's motherboard that interprets and carries out the basic instructions that operate the computer. 6. *See also* **Processor**
- Cracker:** Someone who accesses a computer or network illegal with the intent of destroying data, stealing information, or other malicious action. 382
- Create:** To enter text or numbers, insert images, and perform other tasks with a document using an input device such as a keyboard, mouse, or digital pen. 114, 134
- CRT monitor:** Type of desktop monitor that contains a cathode-ray tube. 210–211, 224  
CT scans, 372
- Custom software:** Software that performs functions specific to a business or industry, developed by a user or at a user's request. 108, 427–428
- Customer interaction management (CIM):** Software that manages the day-to-day interactions with customers, such as telephone calls, e-mail interactions, Web interactions, and instant messaging sessions. 472–473, 494
- Customer relationship management (CRM):** System that manages information about customers, interactions with customers, past purchases, and interest. 478, 494  
cyberbullying, 81
- Cybercafé:** Coffeehouse, restaurant, or other location that provides personal computers with Internet access to its customers. 319, 344
- Cybercrime:** Online or Internet-based illegal acts. 382
- Cyberextortionist:** Someone who uses e-mail as a vehicle for extortion. 382
- Cyberterrorist:** Someone who uses the Internet or network to destroy or damage computers for political reasons. 383  
cylinders (read/write heads), 242–243
- D**
- Dance pad:** Flat electronic device divided into panels that users press with their feet in response to instructions from a music video game. 196, 224
- Data:** Collection of unprocessed items, which can include text, numbers, images, audio, and video. 4, 352, 374  
accidental theft of, 367  
hierarchy of, 355–356  
and information gathering techniques, 422–423  
integrity, 353  
maintaining, 357–360  
security, 367  
validating, 359–360
- Data center:** Centralized location for managing and housing hardware and software. 479
- Data dictionary:** A DBMS element that contains data about each file in a database and each field in those files. 364, 374  
data entry forms, 366
- Data file:** Collection of related records stored on a storage medium such as a hard disk or optical disc. 356, 374
- Data model:** Rules and standards that define how a database organizes data. 368, 375
- Data projector:** Output device that takes the text and images displaying on a computer screen and projects them on a larger screen so that an audience can see the image clearly. 218, 225  
data recovery programs, 284  
data redundancy, 361–362  
data representation, 162–163

- Data type:** Specifies the kind of data a field in a database can contain and how the field can be used. **356**
- Data warehouse:** Huge database that stores and manages the data required to analyze historical and current transactions. **370, 375, 480–481, 494**
- Database:** Collection of data organized in a manner that allows access, retrieval, and use of that data. **116, 134, 352, 374**  
Internet, and privacy, **354**  
largest market share, **363**  
redundant data in, **361–362**  
relational, object-oriented, multidimensional, **368–370**  
remote solar system objects mapped in, **431**  
security breaches, **370**  
Web, **370–371**  
database administration, **371–372**
- Database administrator (DBA):** Person who creates and maintains the data dictionary, manages security of a database, monitors the performance of a database, and checks backup and recovery procedures. **371, 375**
- Database analyst (DA):** Person who focuses on the meaning and usage of data, including proper placement of fields, defining the relationships among data, and identifying users' access privileges. **371, 375**
- Database approach:** System used to store and manage data in which many programs and users share the data in a database. **361–362, 374**
- Database management system (DBMS):** Program that allows user to create a computerized database; add, change, and delete data in the database, sort and retrieve data from the database; and create forms and reports from the data in the database. **352, 374**  
components and workings of, **352–360**  
functions common to most, **364–367**  
popular (fig.), **363**
- Database software:** Application software used to create, access, and manage a database; add, change, and delete data in the database; sort and retrieve data from the database; and create forms and reports using the data in the database. **116, 134, 352, 374**  
features and uses of, **116–117**  
DCS1000, **268**  
Dean, Mark, **261**
- Decision support system (DSS):** Information system that helps users analyze data and make decisions. **475, 494**
- Decrypt:** Process of deciphering encrypted data into a readable form. **395**
- Dedicated line:** Type of always-on connection that is established between two communications devices (unlike a dial-up line where the connection is reestablished each time it is used). **331, 344**  
dedicated servers, **325**
- Defragmenting:** Reorganizing a disk so that the files are stored in contiguous sectors, thus speeding up disk access and the performance of the entire computer. **266–267, 286**  
deleting  
data with wiping utilities, **241**  
records from database files, **358–359**  
Dell hybrid computers, **52**  
Dell notebooks, **54**
- Delphi:** Powerful visual programming tool that is ideal for large-scale enterprise and Web application development. **443**
- Denial of service attack:** Assault on a computer or network whose purpose is to disrupt computer access to an Internet service such as the Web or e-mail. **387, 410**. *See also* **DoS attack**
- Design phase:** Phase of the system development cycle that consists of two major activities: (1) if necessary, acquire hardware and software and (2) develop all of the details of the new or modified information system. **428, 456**
- Desktop:** On-screen work area that has a graphical user interface. **110, 134**
- Desktop computer:** Computer designed so the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table. **16**  
buying guide, **302–306**
- Desktop publishing (DPT) software:** Application software used by professional designers to create sophisticated documents that can contain text, graphics, and many colors. **120, 121, 134**
- Developer:** Person who writes and modifies computer programs. **13, 435**. *See also* **Programmer**
- devices**  
configuring, **276**  
input. *See* input device  
output. *See* output device  
DeWolfe, Chris, **29**
- Dial-up access:** Internet access that takes place when the modem in your computer connects to the Internet via a standard telephone line that transmits data and information using an analog (continuous wave pattern) signal. **58, 84**
- Dial-up line:** Temporary connection that uses one or more analog telephone lines for communications. **305, 331, 344**
- Dial-up modem:**  
Communications device that can convert digital signals to analog signals and analog signals to digital signals, so that data can travel along an analog telephone line. **333, 344**  
differential backup, **490**
- Digital:** Representation of data using only two discrete states: on (1) and off (0). **162, 180**  
digital books, **251**
- Digital camera:** Mobile device that allows users to take pictures and stores the photographed images digitally, instead of on traditional film. **18, 42, 197–198, 506**  
Apple QuickTake, **43**  
buying guide, **311–312**  
Kodak's first, **42**  
and memory cards, **248**  
and printers, **212**  
transferring video to computer, **228–229**
- Digital certificate:** A notice that guarantees a user or a Web site is legitimate. **395, 410**  
digital communications forms of, **142–153**  
overview, **141**  
in personal life, **154**
- Digital Equipment Corporation (DEC), **39**
- Digital forensics:** The discovery, collection, and analysis of evidence found on computers and networks. **392**
- digital formats for video, **232**
- Digital literacy:** Having a current knowledge and understanding of computers and their uses. **3**. *See also* **Computer literacy**
- Digital modem:**  
Communications device that sends and receives data and information to and from a digital line. **333**
- Digital pen:** Input device that looks like a small ink pen but uses pressure instead of ink. **194, 224, 307**
- Digital photo printer:** Thermal printer that uses heat to transfer colored dye to specially coated paper. **215–216**
- Digital rights management:** Strategy designed to prevent illegal distribution of movies, music, and other digital content. **401**
- Digital signature:** Encrypted code that a person, Web site, or organization attaches to an electronic message to verify the identity of the message sender. **395, 396, 410**
- Digital video (DV) camera:**  
Video camera that records video as digital signals instead of as analog signals. **5, 47, 199, 228, 303**  
digital video recorders (DVRs), **503**  
digital video technology, **231–236**  
digital voice communications, personal and business perspectives on, **146–147**
- Dijkstra, Dr. Edsger, **39**
- Direct conversion:** Conversion strategy where the user stops using an old system and begins using a new system on a certain date. **433**
- disabling cookies, **404**
- Disaster recovery plan:** Written plan describing the steps a company would take to restore computer operations in the event of a disaster. Contains four major components: emergency plan, backup

- plan, recovery plan, and test plan. **491**, 495
- Disc burning software:** Utility program that writes text, graphics, audio, and video files to a recordable or rewritable CD, DVD, or Blu-ray Disc. **291**, 295
- Discovering Computers Fundamentals 2011 Online Companion, 34
- Disk Cleanup, 266
- Disk cleanup:** Utility that searches for and removes unnecessary files. **286**, 295
- Disk controller:** Special-purpose chip and electronic circuits that control the transfer of data, instructions, and information between a disk and the system bus and other components in a computer. **246**, 262
- Disk Defragmenter, 266
- Disk defragmenter:** Utility that reorganizes the files and unused space on a computer's hard disk so that the operating system accesses data more quickly and programs run faster. **286**, 295
- Display device:** Output device that visually conveys text, graphics, and video information. **207**, 224 for notebook computers, 307 types of, 207–211
- DisplayPort, 209
- Distance learning:** Delivery of education at one location while the learning takes place at other locations. **131**
- distributing videos, 236
- Distribution system:** Provides forecasting for inventory control, manages and tracks shipping of products, and provides information and analysis on inventory in warehouses. **472**, 494
- DivX video format, 233–234
- DNA barcoding, 365
- Docking station:** External device that attaches to a mobile computer or device and provides power connections to peripherals, along with memory cards, optical disc drives, and other devices. **173**
- Document management software:** Application software that provides a means for sharing, distributing, and searching through documents by converting them into a format that can be viewed by any user. **119**, 134
- Document management system:** System for storage and management of a company's documents, such as word processing documents, presentations, and spreadsheets. **321**
- Documentation:** Collection and summarization of data and information. **422**, 456
- documents  
creating, printing, 114, 212  
turnaround, 200
- Dolby, Ray, 502
- Domain name:** Text version of an IP address. **60**
- do-not-track list, 65
- DoS attack:** Assault on a computer or network whose purpose is to disrupt computer access to an Internet service such as the Web or e-mail. **387**. *See also*
- Denial of service attack**  
safeguards against, 388–389
- dot pitch, 209
- Dot-matrix printer:** Type of impact printer that produces printed images when tiny wire pins on a print head mechanism strike an inked ribbon. **217**, 225
- do-until, do-while control structures, 453
- Downloading:** Process of a computer receiving information, such as a Web page, from a server on the Internet. **62**
- music, 72, 502
- taxing, 291
- Dreamweaver:** Web page authoring program by Adobe Systems that allows Web developers to create, maintain, and manage professional Web sites. **449**, 456
- Drive bay:** Rectangular opening inside the system unit that typically holds disk drives. **175**, **175**
- Driver:** Small program that tells an operating system how to communicate with a specific device. **276**, 294
- driving directions, searching for, 88–89
- DSL:** Type of digital technology that provides high-speed Internet connections using regular copper telephone lines. **57**, 84, **332**, 344
- DSL modem:** Modem that sends digital data and information from a computer to a DSL line and receives digital data and information from a DSL line. **333**, 344–345
- Dual-core processor:** Processor chip that contains two separate processor cores. **159**
- DVD burners, 47
- DVD kiosk:** Self-service DVD rental machine that connects to a host computer through a network. **205**
- DVD+R, 253
- DVD+RAM:** Rewritable DVD format. **256**, 263
- DVD+RW:** Rewritable DVD format. **256**, 263
- DVD-R, 253
- DVD-RAM, 253
- DVD-ROM:** High-capacity optical disc on which users can read, but not write or erase. **256**, 263
- DVD-ROM drive:** Device that can read a DVD-ROM. Most DVD-ROM drives also can read audio CDs, CD-ROMs, CD-Rs, and CD-RWs. **256**
- DVD-RW:** Rewritable DVD format. **256**
- DVI (Digital Video Interface), 209
- dye-sublimation printers, 215–216
- Dynamic HTML (DHTML):** Newer type of HTML that allows Web developers to include more graphical interest and interactivity in a Web page. **448**, 456
- E**
- Earbuds:** Audio output device that rests inside the ear canal. **18**, **218**, 225, 245. *See also*
- Earphones**
- Earphones:** Audio output device that rests inside the ear canal. **218**. *See also* **Earbuds**
- eBay, 44, 83, 394, 493
- E-book:** Electronic version of a printed book, readable on computers and other digital devices. Also called a digital book. **17**
- E-book reader:** Short for electronic book reader; handheld device that is used primarily for reading e-books. **17**
- Eckert, J. Presper, Jr., 37
- E-commerce:** Short for electronic commerce; a business transaction that occurs over an electronic network such as the Internet. **45**, **46**, **74** and cookies, 403–404 examples of, 484–485 milestones in computer history, 45, 46
- EDI (electronic data interchange):** Set of standards that controls the transfer of business data and information among computers both within and among enterprises. **480**
- Edit:** To make changes to the existing content of a document. **114**, 134
- videos, 234–235
- education  
computer applications in, 24–25  
computer usage in, 292  
e-learning systems, 131  
government search and seizure of, 176  
learning Web sites, 102  
technology in the classroom, 166  
using wikis for research, 68  
word processing programs and student laziness, 113
- Educational software:**  
Application software that teaches a particular skill. **21**, **123**, **127**, **135**
- EIDE hard disk interface, 246
- educational Web sites, 69
- E-learning:** Short for electronic learning; delivery of education via some electronic method such as the Internet, networks, or CDs/DVDs. **131**, 292
- electromagnetic radiation (EMR), 211
- Electronic Arts (EA), 455
- electronic books, 251
- electronic keyboards, 198
- Electronic magazine:**  
Publication available on the Web. **428**. *See also* **E-zine**
- electronic profiles, 403
- Electronic storefront:** Online business a customer visits that contains product descriptions, graphics, and a shopping cart. **74**
- electronics, recycling of, 14
- Elk Cloner virus, 40



- Ellison, Larry, 373
- e-mail, 130, 316
- attaching file to message, 88
  - getting virus from, 77
  - how viruses spread, 385
  - and identify theft, 10
  - lying and, 423
  - personal and business perspectives on, 142–143
  - scanning attachments, 387
  - spam, 404–405
- E-mail address:** Combination of a user name and a domain name that identifies a user so he or she can receive Internet e-mail. **76–77**
- E-mail filtering:** Service that blocks e-mail messages from designated sources. **405**
- e-mail message, 231
- E-mail program:** Software used to create, send, receive, forward, store, print, and delete e-mail messages. **75–76**
- Embedded computer:** Special-purpose computer that functions as a component in a larger product. **15, 19–20, 24**
- Embedded Linux, 283
- Embedded operating system:** The operating system that resides on a ROM chip inside most PDAs and small devices. **283, 294**
- EMC, 493
- emergency plans, 491
- Emoticons:** Symbols used on the Internet to express emotion. **81**
- Employee monitoring:** The use of computers to observe, record, and review an employee's use of a computer, including communications such as e-mail messages, keyboard activity (used to measure productivity), and Web sites visited. **407, 422**
- Employee relationship management (ERM):** Information system that automates and manages much of the communications between the employees and the business. **471, 494**
- employment
- privacy of text messages, 407
  - repetitive strain injuries responsibilities, 192
- Encryption:** Process of converting readable data into unreadable characters to prevent unauthorized access. **278, 395, 410**
- Encryption algorithm:** Set of steps that can convert readable plaintext into unreadable ciphertext. **395**
- Encryption key:** Set of characters that the originator of the encrypted data uses to encrypt the plaintext and the recipient of the data uses to decrypt the ciphertext. **395**
- end-user license agreement (EULA), 394
- ENERGY STAR program:** Program developed by the United States Department of Energy (DOE) and the United States Environmental Protection Agency (EPA) to help reduce the amount of electricity used by computers and related devices. **401**
- Engelbart, Douglas, 223
- engineering as functional unit, 469, 471
- enhanced keyboards, 190
- ENIAC computer, 37
- Enterprise computing:** The use of computers in networks, such as LANs and WANs, or a series of interconnected networks that encompass a variety of different operating systems, protocols, and network architectures. **23, 464, 494**
- enterprise hardware, 485–489
- information systems in, 468–479
- overview of, 464–468
  - software, 112, 119
  - technologies, methodologies, 479–483
- Enterprise hardware:** Devices geared for heavy use, maximum availability, and maximum efficiency that large organizations use to manage and store information and data. **485, 495**
- examples of solutions, 485–486
- Enterprise information:** Information gathered in the ongoing operations of an enterprise-sized organization. **468**
- Enterprise resource planning (ERP):** Provides centralized, integrated software to help manage and coordinate the ongoing activities of the enterprise. **477–478, 494**
- Enterprise search:** Technology that allows users to perform searches across many enterprise-wide information systems and databases. **479**
- Enterprise storage system:** Strategy that focuses on the availability, protection, organization, and backup of storage in a company. **258–259, 487–488, 495**
- Enterprise user:** Computer user working for a business that has hundreds or thousands of employees or customers that work in or do business with offices across a region, the country, or the world. **23–24**
- suggested input and output devices (fig.), 219
  - suggested minimum configuration (fig.), 176
  - typical storage devices (fig.), 259
- enterprises, types and structure, 466–467
- entertainment
- computers use of, 82
  - e-commerce examples, 484
- Entertainment software:** Application software, such as interactive games, videos, and other programs designed to support a hobby or provide amusement and enjoyment. **128, 135**
- environment
- computers impact on, 7
  - Web sites for, 97
- EPA AirData Web site, 97
- Epstein, Bob, 373
- E-retail:** Business transaction that occurs when retailers use the Web to sell their products and services. **74–75, 484**
- Ergonomics:** The science of incorporating comfort, efficiency, and safety into the design of the workplace. **190, 399**
- ERM (employee relationship management) software, 471
- eSATA (external SATA), 246
- eSATA port:** External SATA; port that allows you to connect a high-speed external SATA (Serial Advanced Technology Attachment) hard disk to a computer. **172, 181**
- Ethernet:** Network standard that specifies no central computer or device on the network should control when data can be transmitted. **40, 329, 334, 336**
- ethics
- accessibility, and physically challenged users, 220–221
  - accidental theft of data, 367
  - cashless society, 257
  - computer, **399–402**
  - cyberbullying and banning anonymous comments, 81
  - government requiring hard disk cleaning, 241
  - government search and seizure of computers, 176
  - macro security responsibility, 445
  - medical records access, 259
  - monitoring customer behavior, conversation, 402
  - monitoring of online behavior, 65
  - monitoring people in public locations, 203
  - netiquette, 81
  - online auctions and pirated software sales, 394
  - reliability of wikis for research, 68
  - responsibility for bugs, 450
  - tax on media downloads, 291
  - technology in the classroom, 166
  - time for maintaining records, 488
  - trustworthiness of online purchasing, 485
  - use of mobile devices at work, 467
  - word processing programs and student laziness, 113
- e-waste, 14
- Execute:** Process of a computer carrying out the instructions in a program. **12**
- executive information system (EIS), 474–475
- Expansion bus:** Bus that allows the processor to communicate with peripherals. **174, 181**
- Expansion card:** Circuit board that enhances functions of a component of a system unit and/or provides connections to peripherals. **169, 180. See also Adapter card**
- Expansion slot:** Socket on a motherboard that can hold an adapter card. **169, 180**
- Expert system:** Information system that captures and stores the knowledge of human experts and then imitates human reasoning and decision making. **476, 494**

**ExpressCard module:**

Removable device that can be used to add memory, communications, multimedia, and security capabilities to mobile computers. **170, 239, 250, 262**

**ExpressCard slot:** Special type of expansion slot in desktop computers, notebook computers, and other mobile computers that holds an ExpressCard module. **170**

**Expression Web:** Microsoft's

Web page authoring program that enables Web developers to create professional, dynamic, interactive Web sites. **449, 456**

**External hard disk:** Separate freestanding hard disk that connects with a cable to a USB port or FireWire port on the system unit. **5, 238, 244–245, 262, 303**

**Extranet:** Portion of a company's network that allows customers or suppliers of a company to access parts of an enterprise's intranet. **481, 494**

**E-zine:** Publication available on the Web. **428.** *See also* **Electronic magazine**

**F**

**F#:** Programming language included with Visual Studio 2010 that combines the benefits of an object-oriented language with the benefits of a functional language. **441**

face recognition systems, **202, 203, 408**

Facebook, **48, 69, 83**

**Failover:** The process of one system automatically taking the place of a failed system. **491**

Fanning, Shawn, **46**

fans, power supply, **175**

**FAQ:** List that helps a user find answers to commonly asked questions. **11**

**Favorite:** Saved Web address that you access by clicking its name in a list. **63.** *See also* **Bookmark**

fax, **316**

FBI's National Crime Information Center (NCIC), **25**

**Feasibility:** Measure of how suitable the development of a system will be to the organization. **421, 456**

**Feasibility study:** Investigation that determines the exact nature of a problem or improvement and decides whether it is worth pursuing. **425, 456.** *See also* **Preliminary investigation**

FedEx, **28**

**Fiber to the Premises (FTTP):** Technology that uses fiber-optic cable to provide high-speed Internet access to home and business users. **57, 84**

**Fiber-optic cable:** Dozens or hundreds of thin strands of glass or plastic that use light to transmit signals. **340, 345**

**Fibre Channel:** Technology used to connect to storage systems at data rates up to 4 Gbps. **488**

**Field:** A combination of one or more related characters or bytes, a field is the smallest unit of data a user accesses. **355–356, 374**

field cameras, **197**

**Field name:** Name that uniquely identifies each field in a database. **355–356**

**Field size:** Defines the maximum number of characters a field can contain. **355–356**

**File:** Named collection of stored data, instructions, or information. **110–111**

backing up, **286, 396–397**

backing up on offsite Internet server, **414–415**

burning to optical disc, **298**

e-mail attachments, **88**

organizing, managing on computers, **378–379**

recovering erased, **284**

saving in application software, **138**

zipping (compressing), **138–139**

**File compression utility:** Utility program that shrinks the size of a file(s), so the file takes up less storage space than the original file. **290, 295**

file formats

graphic Web, **71**

PDF, **119**

popular video (fig.), **233**

**File maintenance:** Procedures that keep data current. **357–360, 374**

**File manager:** Utility that performs functions related to file and disk management. **285, 295**

**File processing system:** System used to store and manage data in which each department or area within an organization has its own set of files. **361, 374**

file servers, **325**

finance

accounting software, **119**

computer applications in, **25**

e-commerce examples, **484**

as functional unit, **469–470**

personal finance software, **123, 124**

Web sites for, **98**

**Fingerprint reader:** Biometric device that captures curves and indentations of a fingerprint and compares them with those of a stored image. **202, 303, 309, 391, 393**

**Firewall:** Hardware and/or software that protects a network's resources from intrusion by users on another network such as the Internet. **287, 386–387, 388–389, 397, 410**

**FireWire hub:** Device that plugs in a FireWire port on the system unit and contains multiple FireWire ports in which you plug cables from FireWire devices. **172**

**FireWire port:** Port that can connect multiple types of devices that require faster data transmission speeds. **172, 181**

fireworks software, **120**

**Firmware:** ROM chips that contain permanently written data, instructions, or information, recorded on the chips when they were manufactured. **167**

**Fixed wireless:** High-speed Internet connection that uses a dish-shaped antenna on a house or business to communicate with a tower location via radio signals. **57, 84**

**Flash:** Web page authoring program that enables Web developers to combine interactive content with text, graphics, audio, and video. **449, 456**

**Flash memory:** Type of nonvolatile memory that can be erased electronically and rewritten. **167, 180**

storage, **247–250**

Flash Player, **73, 449**

**Flatbed scanner:** Type of light-sensing input device that scans a document and creates a file of the document in memory instead of a paper copy. **200**

**Focus groups:** Lengthy, structured, group meetings in which users and IT professionals work together to design or develop an application. **423.** *See also* **Joint application design (JAD)**

**Folder:** Specific named location on a storage medium that contains related documents. **285**

**Font:** Name assigned to a specific design of characters. **114**

**Font size:** Size of the characters in a particular font. **114**

**Font style:** Font design, such as bold, italic, and underline, that can add emphasis to a font. **114**

**Form:** Window on the screen that provides areas for entering or modifying data in a database. **366, 374**

form generators, **444–445**

**Format:** To change a document's appearance. **114, 134**

optical disc (fig.), **253**

video, **232**

FORTTRAN computer language, **38**

frame rate correction, **234–235**

Frankston, Bob, **40**

Free Software Foundation, **409**

FreeAgent DockStar network adapter, **261**

**Freeware:** Copyrighted software provided at no cost to a user by an individual or a company that retains all rights to the software. **109**

**Front side bus:** Bus that is part of the motherboard and connects the processor to main memory. **174, 181.** *See also* **System bus**

Friendster, **230**

Fry's Electronics Web site, **100**

**FTP:** Internet standard that permits file uploading and downloading with other computers on the Internet. **80, 316**

software, **130**

FTTB (Fiber to the Building), **332**

FTTH (Fiber to the Home), **332**

**FTTP (Fiber to the Premises):**

Dedicated line that uses fiber-optic cable to provide extremely high-speed Internet access to a user's physical permanent location. **332, 344**

full backup, 490

fun and entertainment Web sites, 92

functional units in organizations, 119, 468–477

functions of operating system, 270–279

**G**

**Game console:** Mobile computing device designed for single-player or multiplayer video games. **15, 18, 505**

**Game controller:** Input device that directs movements and actions of on-screen objects in video games and computer games. **189, 196, 197, 224**

**Gamepad:** Pointing device that controls the movement and actions of players or objects in video games or computer games. **196, 224**

gaming, living digitally (feature), 505

Gantt, Henry L., 420

Gantt charts, 420–421

GarageBand software, 504

**Garbage in, garbage out**

**(GIGO):** Computing phrase that points out the accuracy of a computer's output depends on the accuracy of the input. **353**

Gates, Bill, 29, 40, 52

geocaching, 92, 321

ghosting, 287

GIF file format, 71

**Gigabyte (GB):** Approximately 1 billion bytes. **164**

**Gigahertz (GHz):** One billion ticks of the system clock per second. **161**

glaucoma, contact lenses monitoring, 277

**Global Positioning System**

**(GPS):** Navigation system that consists of one or more earth-based receivers that accept and analyze signals sent by satellites in order to determine the receiver's geographic location. **43, 320, 344, 505**

GNU/Linux Project, 409

Google, 11, 45, 52, 479

and cloud computing, 484

company profile, 83

using search engine, 66

Google Android operating system, 283

Google Docs, 129, 292, 321

Google Earth, 129

Google Health, 104

Google Maps, 448

Google News, 101

Google Wave, 54

Gosling, James, 455

government

airport security screening, and damage to media, 250

computer applications in, 25

do-not-track list, 65

requiring hard disk cleaning, 241

resources Web sites, 99

search and seizure of computers, 176

taxing media downloads, 291

W3C accessibility guidelines, 220

**Graphic:** Digital representation of nontext information such as a drawing, chart, or photo. **70, 71, 84**

**Graphical user interface (GUI):**

Type of user interface that allows a user to interact with software using text, graphics, and visual images, such as icons. **11, 273, 294**

**Graphics card:** Adapter card that converts computer output into a video signal that travels through a cable to the monitor, which displays an image on the screen. **169, 180. See also Video card**

**Graphics tablet:** Flat, rectangular, electronic, plastic board that is used to create drawings and sketches. **189, 194, 224**

**Green computing:** Practices that involve reducing the electricity consumed and environmental waste generated when using a computer. **7, 23, 54, 140, 300, 343, 399–400, 401–402**

**Grid computing:** Technology that combines many servers and/or personal computers on a network to act as one large computer. **484, 495**

GrimE game engine, 82

**Groupware:** Software that helps groups of people work together on projects and share information over a network.

**321, 344**

**H**

**Hacker:** Someone who accesses a computer or network illegally. **287, 382**

**Handheld computer:** Computer small enough to fit in one hand. **17, 42. See also Ultra-Mobile PC (UMPC)**

**Hard disk:** Type of storage device that contains one or more inflexible, circular platters that use magnetic particles to store data, instructions, and information. **6, 240, 261**

characteristics, types, configurations, 240–246

maintenance of, 266

purchasing external, 303

**Hardware:** Electric, electronic, and mechanical components contained in a computer. **4, 30**

purchasing components, 303–304

setting up Wi-Fi home network, 337

hardware firewalls, 389

**Hardware theft:** The act of stealing computer equipment. **383, 393, 410**

**Hardware vandalism:** The act of defacing or destroying computer equipment. **393, 410**

Hawthorne Effect, 422

Hayes modems, 41

**HD VMD:** Versatile Multilayer Disc; high-density format that potentially will contain up to 20 layers, each with a capacity of 5 GB. **256, 263**

HDMI port, 171, 209

head crashes, 244

head-mounted display (HMD), 503

**Headphones:** Audio output device that covers or is placed outside the ear. **218**

**Headset:** Device that functions as both headphones and a microphone. **218**

health

body area networks (BANs), 323

computer-related risks, 7

concerns of computer use, 398–399

contact lenses monitor

glaucoma, 277

e-commerce examples, 484

electromagnetic radiation (EMR) from CRT monitors, 211

Internet Addiction Disorder (IAD), 230

radiation from cell phones, 340

repetitive strain injuries, 191

sciences' use of computers, 372

Web sites for, 104

health care, computer applications in, 25–26

Health Insurance Portability and Accountability Act (HIPAA), 259

healthfinder.gov Web site, 104

Hejlsberg, Anders, 441

help, online, 131

Hewlett, William, 223

Hewlett-Packard LaserJet printer, 41

**Hibernate:** Operating system function that saves any open documents and programs to a hard disk before removing power from the computer. **272**

hierarchy of data, 355–356

**High-availability system:** System that continues running and performing tasks for at least 99 percent of the time. **489–490**

high-definition (HD) digital video recorders (DVRs), 503

high-level programming languages, 436, 438–449

HIPAA (Health Insurance Portability and Accountability Act), 259

**Hi-Speed USB:** More advanced and faster type of USB. **172**

hits, 66

Hoff, Dr. Ted, 40

Hoffman, Mark, 373

**Home design/landscaping**

**software:** Application software that assists users with the design, remodeling, or improvement of a home, deck, or landscape. **123, 127, 135**

**Home network:** Network consisting of multiple devices and computers connected together in a home. **336–337, 345**

setting up, installing Wi-Fi, 348–349

setting up wireless, 336–337

**Home page:** First page that a Web site displays. **62**



- Home user:** User who spends time on a computer at home. 20–21  
cable modem and, 59  
suggested input and output devices (fig.), 219  
suggested minimum configuration (fig.), 176  
typical storage devices (fig.), 259  
home/personal/educational software, 108  
Hopper, Dr. Grace, 38, 440  
horizontal market software, 427
- Hot spot:** Wireless network that provides Internet connections to mobile computers and other devices. 318–319, 344
- Hot spots:** Public locations, such as airports, hotels, schools, and coffee shops, that provide Wi-Fi Internet connections to users with mobile computers or devices. 51, 58  
hot-swapping, 490–491  
households, living digitally (feature), 506  
How To's Web sites, 102  
HowStuffWorks Web site, 102  
HP (Hewlett-Packard), 223
- HTML:** Hypertext Markup Language; special formatting language that programmers use to format documents for display on the Web. 446, 456
- HTTP (Hypertext Transfer Protocol),** 63  
hub, 172  
Hubble Space Telescope, 71  
Human Genome Project, 373  
human resources as functional unit, 469, 470–471
- Human resources information system (HRIS):** Information system that manages one or more human resources function(s). 470, 494  
Hurley, Chad, 493
- Hyperlink:** Built-in connection to another related Web page or part of a Web page. 64. *See also Link*  
Hypertext Transfer Protocol (http), 63
- I**  
IBackup.com, 414–415  
IBM, 261  
company profile, 493  
milestones in computer history, 38, 39, 40, 50  
and use of information about them. 399–400, 402, 411  
threats to, 402–407
- Information processing cycle:** Series of input, process, output, and storage activities performed by a computer. 4
- Information system:** Hardware, software, data, people, and procedures that a computer requires to generate information. 456, 468, 494  
integrated, 477–478  
types in the enterprise, 468–477
- Information system (IS):** Collection of hardware, software, data, people, and procedures that work together to produce quality information. 418  
information technology (IT) departments, 469, 473
- Information theft:** Computer security risk that occurs when someone steals personal or confidential information. 383, 395, 410  
informational Web sites, 68  
infrared (IR) wireless transmission media, 341
- Ink-jet printer:** Type of nonimpact printer that forms characters and graphics by spraying tiny drops of liquid ink on a piece of paper. 213, 216, 225
- Input:** Any data and instructions entered into the memory of a computer. 188  
biometric, 202–203  
scanning, reading devices, 200–202  
voice, video, 198–199
- Input device:** Any hardware component that allows users to enter data and instructions into a computer. 4, 30, 188  
for physically challenged users, 220–221  
and the processor, 159  
types of, 188–194
- Installing:** Process of setting up software to work with the computer, printer, and other hardware components. 12  
and running programs, 12–13  
Wi-Fi home network, 348–349
- Instant message:** Real-time Internet communication where you exchange messages with other connected users. 17
- Instant messaging (IM):** Real-time Internet communications service that notifies a user when one or more people are online and then allows the user to exchange messages or files or join a private chat room with those people. 78, 130, 316  
personal and business perspectives on, 144–145  
using, 78–79  
wireless, 318
- Instant Search box, 67  
integrated circuits, 179  
Intel  
company profile, 179  
milestones in computer history, 42, 43, 44, 45, 46, 47, 50, 51, 53  
processor, 161
- Intellectual property rights:** Rights to which creators are entitled for their work. 401
- Interactive whiteboard:** Touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen. 218, 225  
internal hard disk, 238  
International Space Station, 222
- Internet:** Worldwide collection of networks that connects millions of businesses, government agencies, educational institutions, and individuals. 8, 56, 316, 324. *See also Net*  
addresses, 60  
attacks, 384–389  
connecting to, 57–58  
connection types and speeds (fig.), 332  
filters, 289  
number of households using in U.S., 21  
overview, 8–10, 56–60  
various services, 75–81  
Internet Addiction Disorder (IAD), 230
- Internet backbone:** Major carriers of network traffic on the Internet. 59  
Internet Explorer, 44  
Internet service provider. *See ISP* (Internet service provider)
- Internet-enabled:** Technology that allows mobile devices to connect to the Internet wirelessly. 16
- Icon:** Small image displayed on a computer screen that represents a program, a document, or some other object. 11, 110
- IDE (integrated development environment):** Includes program development tools for building graphical user interfaces, an editor for entering program code, a compiler and/or interpreter, and a debugger. 440  
identifying animals with embedded chips, 158  
identity theft, 10, 392  
IEEE network standards, 328  
if-then-else control structure, 452  
iLife software, 504
- Image editing software:** Application software that provides the capabilities of paint software and also includes the capability to enhance and modify existing images and pictures. 121, 126, 134
- Image viewer:** Utility program that allows users to display, copy, and print the contents of a graphics file. 285, 295
- Impact printer:** Type of printer that forms characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper. 217
- Implementation phase:** Phase of system development during which the new or modified system is constructed, or built, and then delivered to the users. Four major activities performed include: (1) develop programs, (2) install and test the new system, (3) train users, and (4) convert to the new system. 432, 456  
incremental backup, 490
- Information:** Processed data that conveys meaning and is useful to people. 4, 352, 374  
accuracy of, 400  
gathering techniques, 422–423  
personal, supplying to companies, 473  
qualities of valuable, 354  
safeguarding personal, 402–407  
information literacy, 91
- Information privacy:** Right of individuals and companies to deny or restrict the collection

- Interoperability:** Sharing information with other information systems within an enterprise. **490**
- Interpreter:** Program used to convert a source program into machine language and then executes the machine language instructions. **438**
- interviews, conducting effective, 460–461
- Intranet:** An internal network that uses Internet technologies. **328**
- Intrusion detection software:** Program that automatically analyzes all network traffic, assesses system vulnerabilities, identifies any unauthorized intrusions, and notifies network administrators of suspicious behavior patterns or system breaches. **389, 410**
- IP address:** A number that uniquely identifies each computer or device connected to the Internet. **60**
- iPhone, 51, 112, 133, 283
- iPod, 17, 72, 502, 505
- IrDA:** Network standard used to transmit data wirelessly via infrared (IR) light waves. **330, 341**
- IrDA port:** Port that uses infrared light waves to transmit signals between a wireless device and a computer. **172, 181**
- iris recognition systems, 203
- IRS Web site, 98
- ISDN:** Set of standards for digital transmission of data over standard copper telephone lines. **332, 344**
- ISDN modem:** Modem that sends digital data and information from a computer to an ISDN line and receives digital data and information from an ISDN line. **333, 344**
- ISP (Internet service provider):** Regional or national Internet access provider. **58, 59, 84**
- IT consultant:** Employee, typically hired based on computer expertise, who provides computer services to his or her clients. **429**
- iTunes, 72, 369
- iWeb, 504
- J**
- JAD sessions, 423
- Java:** Object-oriented programming language developed by Sun Microsystems. 44, 427, **440–441, 455, 456, 481**
- JavaScript:** Interpreted language that allows a programmer to add dynamic content and interactive elements to a Web page. 427, **447**
- job search Web sites, 105
- Jobs, Steven, 29, 40
- Joint-application design (JAD):** Lengthy, structured, group meetings in which users and IT professionals work together to design or develop an application. **423, 456. See also Focus groups**
- Joystick:** Pointing device used for games or flight and driving simulations that is a vertical lever mounted on a base. **196, 221, 224, 303**
- K**
- Kerny, Dr. John, 39
- Keyboard:** Input device that contains keys users press to enter data and instructions into a computer. 5, 188, **190, 224** for physically challenged users, 220
- and pointing devices, 189–192
- types, components of, 190–191
- keypads, 191
- Kilby, Jack, 38, 179
- Kilobyte (KB or K):** Exactly 1,024 bytes. **164**
- Kiosk:** Free-standing computer that usually includes a touch screen. **193, 224**
- DVD, 205
- Kodak digital cameras, 42
- Kodak Picture CD, 255
- L**
- L1 cache:** A type of memory cache that is built directly into the processor chip, with a capacity of 8 KB to 128 KB. **167**
- L2 cache:** A type of memory cache that is slightly slower than L1 cache, but has a much larger capacity, ranging from 64 KB to 16 MB. **167**
- labor, impact of computers on, 7
- Laptop computer:** Portable, personal computer often designed to fit on your lap. **16. See also Notebook computer**
- Large Synoptic Survey Telescope (LSST), 431
- Large-format printer:** Printer that creates photo-realistic quality color prints, used mainly by graphic artists. **216, 225**
- Laser mouse:** Type of optical mouse that uses a laser sensor. **191**
- Laser printer:** Type of high-speed, high-quality nonimpact printer that creates images using a laser beam and powdered ink called toner. **214, 215, 225**
- law enforcement, computer applications in, 25
- laws, privacy (fig.), 406
- Lazaridis, Mike, 293
- LCD monitor:** Desktop monitor that uses a liquid crystal display instead of a cathode-ray tube to produce images on a screen, resulting in a sharp, flicker-free display. **208, 209, 224**
- LCD screens, 208
- learning Web sites, 102
- LED screens, 506
- Legacy system:** Information system that has existed within an organization for an extended length of time and is relied upon heavily. **485**
- Legal software:** Application software that assists in the preparation of legal documents and provides legal information to individuals, families, and small businesses. 123, **125, 134**
- legislation, privacy, 406
- Library of Congress Web site, 99
- License agreement:** An agreement issued by a software manufacturer that gives the user the right to use the software. **394**
- light emitting diode (LED), 506
- Light gun:** Game controller used to shoot targets and moving objects after you pull the trigger on the weapon. **196, 224**
- LightScript technology:** Technology that works with specially coated optical discs to etch labels directly on the disc (as opposed to placing an adhesive label on the disc). **253**
- Line printer:** Type of high-speed impact printer that prints an entire line at a time. **217, 225**
- Link:** Built-in connection to another related Web page or part of a Web page. **64, 84. See also Hyperlink** on Web pages, 10
- Linux:** Popular, multitasking UNIX-type operating system. 43, 48, 54, **282, 294**
- Liquid crystal display (LCD):** Type of display that uses a liquid compound to present information on a display device. **209, 224**
- literacy, computer and digital, 3
- literature Web sites, 106
- living digitally (feature), 501–506
- Local area network (LAN):** Network that connects computers and devices in a limited geographical area such as a home, school computer laboratory, office building, or closely positioned group of buildings. 40, **323, 344**
- Log:** Listing of activities that change the contents of a database. **367, 374**
- Log on:** To access a computer or network as a user. **278**
- Logitech, 223
- Longitudinal recording:** Storage technique in which magnetic particles are aligned horizontally around the surface of the disk. **240, 262**
- Lotus Development Corporation, 41
- Louvre Museum Web site, 106
- low-level languages, 436–437
- LSI (large-scale integration) chip, 39
- LucasArts, 82
- Lucent Technologies, 343
- M**
- Mac OS, 11
- Mac OS X:** Multitasking operating system that is the latest version of the Macintosh operating system. **281, 294**
- machine cycle, 160
- Machine language:** The only language a computer directly recognizes, using a series of binary digits or a combination of numbers and letters that represent binary digits. **436–437**

- Macintosh computer, 40, 48, 51
- Macintosh operating system:**  
Operating system for Apple's Macintosh computer. **281**
- Macro:** Series of statements that instructs an application how to complete a task. **445, 456**
- macro viruses, 386
- magnetic disks, 242–243
- Magnetic stripe card:** Credit card, entertainment card, bank card, or other similar card, with a stripe that contains information identifying you and the card. **238, 257, 263**
- Magnetic stripe card reader:**  
Reading device that reads the magnetic stripe on the back of credit, entertainment, bank, and other similar cards. **188, 201–202, 224**
- magstripe readers, 188, 204
- Mailing list:** Group of e-mail names and addresses given a single name. Also called an e-mail list or a distribution list. **78**
- Mainframe:** Large, expensive, powerful computer that can handle hundreds or thousands of connected users simultaneously, storing tremendous amounts of data, instructions, and information. **15, 19, 30**
- Maintaining:** Act of correcting errors or adding enhancements to an existing program. **450**
- maintenance  
of computers, **177**  
of data, **357–360**  
of data stored on hard disk, **246**  
of hard disks, **266**  
of optical discs, **253–254**
- Malware:** Short for malicious software; programs that act without a user's knowledge and deliberately alter a computer's operations. **10, 384, 410**  
safeguards against, **385–387**
- Management information system (MIS):** Information system that generates accurate, timely, and organized information, so managers and other users can make decisions, solve problems, supervise activities, and track progress. **474–475, 494**
- Managers:** Employees responsible for coordinating and controlling an organization's resources. **468, 494**
- managing  
files on computers, **378–379**  
memory, **275**  
programs, **273–275**  
videos, **232–233**
- manufacturing  
computer applications in, **27**  
as functional unit, **469, 471**
- mapping services, online, **129**
- mapping software, **123**
- Marini, Giacomo, **223**
- marketing as functional unit, **472**
- Marketing information system:**  
Information system that serves as a central repository for the tasks of the marketing functional unit. **472, 494**
- Mashup:** Web application that combines services from two or more sources, creating a new application. **322**
- massively multiplayer online games (MMOGs), **505**
- Material Requirements Planning (MRP):** Approach to information management in a manufacturing environment that uses software to help monitor and control processes related to production. **471, 494**
- Mauchly, Dr. John W., **37**
- MBDF virus, **409**
- McAfee, **409**
- McAfee antivirus programs, **386**
- Media player:** Program that allows you to view images and animation, listen to audio, and watch video files on your computer. **290, 295**
- Media sharing Web site:**  
Specific type of online social network that enables members to share media such as photos, music, and videos. **69, 95, 231, 236, 371**
- media, transmission, **338**
- medicine  
computer applications in, **25–26**  
medical history Web sites, **104**  
medical records access, **259**  
medical uses of Wii, **18**
- Megabyte (MB):** Approximately 1 million bytes. **164**
- Memory:** Electronic components in a computer that store instructions waiting to be executed and data needed by those instructions. **6, 157, 163, 180**
- flash. *See* **flash memory**
- managing, **275**
- and the processor, **159**
- purchasing for computers, **184–185**
- types of, **163–169**
- Memory cache:** Cache that helps speed the processes of a computer by storing frequently used instructions and data. **167**
- Memory card:** Removable flash memory device, usually no bigger than 1.5" in height or width, that you insert and remove from a slot in a computer, mobile device, or card reader/writer. **5, 169–170, 212, 248, 262**
- Memory management:**  
Operating system activity that optimizes the use of random access memory (RAM). **275, 294**
- Memory module:** Small circuit board that houses RAM chips and is held in a memory slot on the motherboard. **166**
- Memory slots:** Slots on the motherboard that hold memory modules. **166**
- Memory Stick:** Type of miniature mobile storage medium that is a flash memory card capable of storing between 1 and 16 GB of data. **248, 249, 262**
- Memory Stick Micro (M2):**  
Memory card capable of storing between 1 and 16 GB of data. **248, 249, 262**
- Memory Stick PRO Duo, **249**
- Menu:** Item on the computer screen that contains a list of commands from which a user can make selections. **110**
- menu generators, **444–445**
- Message board:** Popular Web-based type of discussion group that does not require a news-reader. **81, 130**
- Metcalfe, Robert, **40, 343**
- meteorology's use of computers, **260**
- Metropolitan area network (MAN):** High-speed network that connects local area networks in a metropolitan area such as a city or town and handles the bulk of communications activity across that region. **324, 344**
- MICR:** Technology that reads text printed with magnetized ink. **188, 202, 224**
- MICR reader:** Reading device that converts MICR characters into a form that a computer can process. **202**
- Microblog:** Blog that allows users to publish short messages, usually between 100 and 200 characters, for others to read. **10, 68**
- Microfiche:** A small sheet of film, usually about 4 inches by 6 inches in size, on which microscopic images of documents are stored. **258, 263**
- Microfilm:** A roll of film, usually 100 to 215 feet long, on which microscopic images of documents are stored. **238, 258, 263**
- microphone, **5, 189, 303**
- Microprocessor:** Term used by some computer and chip manufacturers to refer to a processor chip for a personal computer. **159**
- MicroSD:** Type of miniature mobile storage medium that is a flash memory card capable of storing between 1 and 2 GB of data. **248, 249, 262**
- MicroSDHC:** Memory card capable of storing between 4 and 16 GB of data. **248, 249, 262**
- Microsoft, **29, 40, 479**  
and cloud computing, **484**  
company profile, **133**  
Excel spreadsheet (fig.), **115, 129**  
LucidTouch sensor technology, **127**  
milestones in computer history, **40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 51, 52, 53, 54**  
Microsoft Access, **364**  
Microsoft Office, programming languages that work with, **442**  
Microsoft Outlook, sending e-mail message, **76**  
Microsoft PowerPoint, **274**
- Microsoft Surface:** Touch screen with a 30-inch tabletop display that allows one or more people to interact with the screen using their fingers or hands. **133, 193, 224**
- Microsoft Windows, **11**
- Microsoft's WorldWide Telescope, **71**
- Microsoft's Xbox, **18, 49, 505**



- Microwaves:** Radio waves that provide a high-speed signal transmission. **341, 345**
- MIDI port:** Special type of serial port that connects the system unit to a musical instrument, such as an electronic keyboard. **172–173, 181**
- milliseconds, **240**
- MiMAX, **52, 318**
- miniature hard disk, **239, 245**
- mini-keyboard, **191**
- MITs, Inc., **40**
- Mobile computer:** Personal computer that a user can carry from place to place. **16, 30**
- described, **15**
- keyboards for, **191**
- typical storage devices (fig.), **259**
- using at work, **467**
- Mobile device:** Computing device small enough for a user to hold in his or her hand. **2, 15, 16, 30**
- cleaning, **177**
- connecting to Internet, **58**
- keyboards for, **191**
- text messaging, **317**
- using at work, **467**
- Mobile printer:** Small, lightweight, battery-powered printer used by a mobile user to print from a notebook computer, smart phone, or other mobile device while traveling. **216, 225**
- mobile TV, **341**
- Mobile users:** Users who work on a computer while away from a main office, home office, or school. **22–23**
- hot spots, **318–319**
- suggested input and output devices (fig.), **219**
- suggested minimum configuration (fig.), **176**
- modems, **5**
- digital, **333**
- Hayes, **41**
- purchasing, **303**
- wireless, **58, 334**
- modifying database file records, **357**
- Monitor:** Display device that is packaged as a separate peripheral. **5, 207, 224**
- ghosting, **287**
- purchasing, **303**
- types of, **207–211**
- monitoring
- automobile time pressure, **20**
  - computer performance, **277**
  - customer behavior, conversations, **402**
  - employees, **407, 422**
  - home energy use, **416**
  - online behavior, **65**
  - people in public locations, **203**
- Moore, Gordon, **179**
- Moore's Law, **179**
- Morris, Robert, **409**
- Morris Worm, **409**
- Motherboard:** Main circuit board of the system unit, which has some electronic components attached to it and others built into it. **154**
- motion-sensing game controllers, **196**
- Mouse:** Pointing device that fits comfortably under the palm of a user's hand. **5, 188, 191, 192, 223, 224**
- Mozilla Firefox browser, **48**
- connections, **192**
- operations, **307**
- purchasing, **303**
- Moving Pictures Experts Group (MPEG), **73**
- Mozilla Firefox 3, **52**
- Mozilla Firefox 4, **54**
- MP3:** Format that reduces an audio file to about one-tenth of its original size, while preserving much of the original quality of the sound. **72, 502**
- MP4:** Current version of a popular video compression standard. **73**
- MS-DOS, **40**
- MSN Money Web site, **98**
- Multi-core processor:** Single chip with two or more separate processor cores. **159**
- Multidimensional database:** Database that stores data in dimensions. **70, 370, 375**
- Multifunctional peripheral:** Output device that looks like a copy machine but provides the functionality of a printer, scanner, copy machine, and perhaps a fax machine. **215, 225.**
- See also All-in-one device*
- Multimedia:** Any application that combines text with graphics, animation, audio, video, and/or virtual reality. **70, 84**
- software types, **108, 120–122**
- virus infections, **385**
- Multimedia authoring software:** Software that allows users to combine text, graphics, audio, video, and animation in an interactive application and that often is used for computer-based training and Web-based presentations. **120, 122, 134, 449**
- Multiprocessing:** In reference to operating systems, supports two or more processors running programs at the same time. **275, 294**
- Multiuser:** In reference to operating systems, enables two or more users to run programs simultaneously. **275, 294**
- municipal services, computer usage, **492**
- music
- living digitally (feature), **502**
  - purchasing, downloading using iTunes, **72**
  - storage on portable media players, **167**
  - Web sites for, **100**
- Music Bug virus, **288**
- MySpace, **29, 47, 69**
- MySpace Mobile, **293**
- N**
- Nanosecond:** One billionth of a second. **168, 240**
- Napster, **46**
- NAS (network attached storage), **244**
- NASA's Web site, **103**
- NASCAR's use of computers, **178**
- National Hurricane Center, **260**
- National Press Photographers Association, **400**
- navigating Web pages, **64**
- Net:** Short for Internet; worldwide collection of networks that links millions of businesses, government agencies, educational institutions, and individuals. **56**
- .NET:** Microsoft's set of technologies that allows almost any type of program to run on the Internet or an internal business network, as well as standalone computers and mobile devices. **441, 481**
- Netbook:** Type of notebook computer that is smaller, lighter, and often not as powerful as a traditional notebook computer. **16**
- Netflix, **52**
- Netiquette:** Short for Internet etiquette, the code of acceptable behaviors users should follow while on the Internet. **81**
- Netscape, **43**
- netomania, **230**
- Netscape, **43**
- Network:** Collection of computers and devices connected together, often wirelessly, via communications devices and transmission media, allowing computers to share resources. **8, 322, 344**
- architectures, topologies, standards, **325–330**
- attacks, **384–389**
- controlling, **277–278**
- home, **336–337**
- setting up, installing Wi-Fi home, **348–349**
- types of, **323–324**
- virtual private network (VPN), **482**
- Network attached storage:** Server connected to a network with the sole purpose of providing storage. **244, 262**
- Network attached storage (NAS):** Server that is placed on a network with the sole purpose of providing storage to users and information systems attached to the network. **486–487, 495**
- Network card:** Communications device that enables a computer or device that does not have built-in networking capability to access a network. **334, 335, 345**
- network port, **171**
- network servers, **325**
- Network standard:** Guidelines that specify the way computers access the medium to which they are attached, the type(s) of medium used, the speeds used on different types of networks, and the type(s) of physical cable and/or the wireless technology used. **328**
- examples of, **329–330**
- Network topology:** Layout of computers and devices in a communications network. **326**
- types of, **326–328**
- networks, **8**

- New Scientist Web site, 103  
news Web sites, 67–68, 101
- Newsgroup:** Online area in which users have written discussions about a particular subject. **80–81, 130, 316**
- newspapers Web sites, 101
- Nintendo  
Game Boy, 42  
game consoles, 18  
Wii, 50, 505
- No Fly List, 408
- Noise:** Electrical disturbance that can degrade communications. **339**
- Nonimpact printer:** Type of printer that forms characters and graphics on a piece of paper without actually striking the paper. **213**  
types of, 213–216
- Nonprocedural language:** Type of programming language in which a programmer writes English-like instructions or interacts with a graphical environment to retrieve data from files or a database. **443, 456**
- Nonvolatile memory:** Type of memory that does not lose its contents when a computer's power is turned off. **164, 180**
- Norton SystemWorks, 291
- Note taking software:**  
Application software that enables users to enter typed text, handwritten comments, drawings, or sketches anywhere on a page. **118, 134**
- Notebook computer:** Portable, personal computer often designed to fit on your lap. **16, 22, 54. See also Laptop computer**  
bendable, 173  
buying guide, 306–309  
ports on, 170–171  
and printers, 212  
with Web cam, 199
- Novell's NetWare, 283
- Numeric check:** Validity check that ensures users enter only numeric data in a field. **360, 374**
- NVIDIA, 179
- O**
- Object:** Database item that contains data, as well as the actions that read or process the data. **369, 375**
- object linking and embedding (OLE), 42
- object query language (OOL), 369
- Object-oriented database (OODB):** Database that stores data in objects. **369, 375**
- Object-oriented programming (OOP) language:**  
Programming language used to implement an object-oriented design. **440, 456**
- OCR devices:** Optical character recognition devices that include small optical scanners for reading characters and sophisticated software to analyze what is read. **200, 224**
- Office information system (OIS):** Information system that enables employees to perform tasks using computers and other electronic devices, instead of manually. **473, 494**
- OLE (object linking and embedding), 42
- Online:** Describes the state of a computer when it is connected to a network. **8**
- online analytical processing (OLAP), 475
- Online auction:** E-commerce method that allows consumers to bid on an item being sold by someone else. **75, 83**
- Online banking:** Online connection to a bank's computer to access account balances, pay bills, and copy monthly transactions to a user's computer. **25, 98, 124, 484**
- Online Help:** Electronic equivalent of a user manual that usually is integrated in a program. **131, 135**
- Online investing:** Use of a computer to buy and sell stocks and bonds online, without using a broker. **25**
- online mapping services, 129
- online payment services, 75
- Online service provider (OSP):**  
Company that provides internet access as well as many members-only features. **58, 84**
- online shopping and cookies, 404
- trustworthiness of, 485
- Online social network:** Web site that encourages members in its online community to share their interests, ideas, stories, photos, music, and videos with other registered users. **10, 48, 69, 84. See also Social networking Web site**
- personal and business perspectives on, 150–151
- Web sites for, 95
- Online trading:** Online connection that allows users to invest in stocks, options, bonds, treasures, certificates of deposit, money markets, annuities, mutual fund, and so on — without using a broker. **484**
- online transaction processing (OLTP), 473
- on-screen keyboards, 191
- OOL (object query language), 369
- open source operating system, 282
- Open source software:** Software provided for use, modification, and redistribution. **45, 109, 282**
- Operating system (OS):** Set of programs that work together to coordinate all the activities among computer hardware resources. **11, 30, 271**  
categories of (fig.), 279  
closed source vs. open source, 282  
embedded, 283  
functions, 270–279  
server, 277, 282  
stand-alone, 280–282  
types of, 279–283
- Operation, support, and security phase:** Phase of system development that consists of three major activities: (1) perform maintenance activities, (2) monitor system performance, and (3) assess system security. **434–435, 456**
- Optical character recognition (OCR):** Optical reader technology that involves reading typewritten, computer-printed, or hand-printed characters from ordinary documents and translating the images to a form that a computer can process. **200, 224**
- Optical disc:** Type of storage medium that consists of a flat, round, portable disc made of metal, plastic, and lacquer that is written on and read by a laser. **6, 252, 263**  
burning files to, 298
- drives, 5, 231
- purchasing, 303
- Optical mark recognition (OMR):** Optical reader technology that reads hand-drawn marks such as small circles or rectangles. **189, 200, 224**
- Optical mouse:** Mouse that uses devices, such as optical sensors or lasers, that emit and sense light to detect the mouse's movement. **191, 224**
- Oracle, 373
- organization of spreadsheets, 115
- organization chart of enterprise (fig.), 466
- organizing files on computers, 378–379
- Ousterhout, Dr. John, 448
- Output:** Data that has been processed into a useful form. **206**  
producing printed, 212
- Output device:** Any hardware component that conveys information to one or more people. **5, 30, 206**  
display devices, 207–211  
for physically challenged users, 220–221  
printers, 211–217  
and the processor, 159  
suggested, by user (fig.), 219
- Outsource:** Having a source outside a company develop software for the company. Some companies outsource just the software development aspect of their IT operation, while others outsource more or all of their IT operation. **428**
- P**
- P2P:** Type of peer-to-peer network on which users access each other's hard disks and exchange files directly over the Internet. **326**
- Packaged software:** Mass-produced, copyrighted retail software that meets the needs of a wide variety of users, not just a single user or company. **108, 427**
- Packard, David, 223
- Page, Larry, 83
- Paint software:** Application software that allows users to draw pictures, shapes, and other graphical images with various onscreen tools. **120, 121, 126, 134**

- Palm OS, 283
- PalmPilot, 44
- Parallel conversion:** Conversion strategy where the old system runs alongside the new system for a specified time. **433**
- Password:** Private combination of characters associated with a user name that allows access to certain computer resources. **278, 390, 410**
- protection (table), 391
- Payload:** Destructive event or prank a malicious-logic program is intended to deliver. **384**
- PayPal, 83, 493
- PC card:** Thin, credit-card-sized removable flash memory device that primarily is used today to enable traditional notebook computers and Tablet PCs to access the Internet wirelessly. **170**
- PC video camera:** Type of digital video camera that enables a home or small business user to capture video and still images, send e-mail messages with video attachments, add live images to instant messages, broadcast live images over the Internet, and make video telephone. **199. See also Web cam**
- PCs vs. Apple computers, 15
- PDA:** Personal digital assistant; lightweight mobile device that provides personal information management functions such as a calendar, appointment book, address book, calculator, and notepad. **17**
- PDF:** Portable Document Format; a popular file format used by document management software to save converted documents. **119**
- Peer-to-peer network:** Simple, inexpensive network that typically connects fewer than 10 computers. **325**
- Pen input:** Input method in which you touch a stylus or digital pen on a flat surface to write, draw, and make selections. **194, 224**
- Performance monitor:** Operating system program that assesses and reports information about various computer resources and devices. **277, 294**
- periodicals Web sites, 103
- Peripheral:** Device that connects to a system unit and is controlled by the processor in the computer. **169, 180**
- multifunction, 215
- Perl:** Practical Extraction and Report Language; scripting language developed at NASA's Jet Propulsion Laboratory as a procedural language similar to C and C++. **448**
- Perpendicular recording:** Storage technique in which magnetic particles are aligned vertically, or perpendicular to the disk's surface, making much greater storage capacities possible. **240, 262**
- Personal computer:** Computer that can perform all of its input, processing, output, and storage activities by itself and contains a processor, memory, one or more input and output devices, and storage devices. **15, 30, 161**
- Personal Communications Services (PCS), 341
- Personal computer maintenance utility:** Utility program that identifies and fixes operating system problems, detects and repairs disk problems, and includes the capability of improving a computer's performance. **291, 295**
- Personal DTP software:** Application software that helps home and small office/home office users create newsletters, brochures, advertisements, postcards, greeting cards, letterhead, business cards, banners, calendars, logos, and Web pages **125, 134**
- Personal finance software:** Simplified accounting program that helps home users or small office/home office users manage finances. **123, 124, 134**
- Personal firewall:** Utility program that detects and protects a personal computer from unauthorized intrusions. **287, 295, 389**
- Personal identification number (PIN):** Numeric password, either assigned by a company or selected by a user. **391**
- Personal information manager (PIM):** Application software that includes features to help users organize personal information. **118, 134**
- groupware for, 322
- software, 112
- personal information, supplying to companies, 473
- Personal paint/image editing software:** Application software that provides an easy-to-use interface, usually with more simplified capabilities that allows users to draw pictures, shapes, and other images. **123, 126, 134**
- Personal photo editing software:** Application software that allows users to edit digital photos by removing red-eye, erasing blemishes, restoring aged photos, adding special effects, enhancing image quality, or creating electronic photo albums. **123, 126**
- personal Web sites, 70
- PERT (Program Evaluations and Review Technique) charts, 420–421
- Phanfare, 95
- Pharming:** Scam, similar to phishing, where a perpetrator attempts to obtain your personal and financial information, except they do so via spoofing. **405**
- Phased conversion:** Conversion strategy used by larger systems with multiple sites where each location converts at a separate time. **433**
- Phases:** Categories into which system development activities are grouped: (1) planning phase, (2) analysis phase, (3) design phase, (4) implementation phase, and (5) support phase. **418, 456**
- Phishing:** Scam in which a perpetrator sends an official looking e-mail that attempts to obtain your personal and financial information. **290, 405, 411**
- Phishing filter:** Program that warns or blocks you from potentially fraudulent or suspicious Web sites. **290, 295, 405**
- phone numbers, searching for, 88–89
- phoneline network, 336
- phones
- business software for, 118–119
- digital voice communications, 146–147
- iPhone. *See* iPhone
- smart. *See* **smart phone**
- video telephone call, 199
- photo editing software, 120, 121
- Photo management software:** Application software that allows users to view, organize, sort, catalog, print, and share digital photos. **123, 126**
- Photo printer:** Type of nonimpact color printer that produces photo-lab-quality pictures. **214, 225, 248**
- photos
- digital frames for, 209
- doctoring, 400–401
- printing using PictBridge, 214
- PHP:** PHP: Hypertext Preprocessor. Free, open source scripting language. **448**
- physical transmission media, 339–340
- physically challenged users, input and output devices for, 220–221
- PictBridge:** Standard technology that allows you to print photos directly from a digital camera by connecting a cable from the digital camera to a USB port on the printer. **214**
- Picture CD:** CD that stores digital versions of film using a jpg file format. **55, 263**
- Picture message:** Photo or other image, sometimes along with sound and text, sent to or from a smart phone or other mobile device. **17, 317**
- Picture messaging:** Wireless messaging service that allows users to send pictures and sound files, as well as short text messages to a phone, a computer, or other mobile device. **318, 344**
- pills, camera, 26
- Pilot conversion:** Conversion strategy where only one location in a company uses a new system — so that it can be tested. **434**
- Piracy:** Unauthorized and illegal duplication of copyrighted material. **393, 394, 401, 410**
- Pixel:** The smallest element in an electronic image. Short for picture element. **198, 209**
- plagiarism and the Internet, 36



- planning  
backups, 490–491  
projects, 420–421
- Planning phase:** Step in system development that begins when a steering committee receives a project request. 418, **425**, 456
- Plasma monitor:** Display device that uses gas plasma technology, which sandwiches a layer of gas between two glass plates. **210**
- platform functions, 272
- platters, 242–243
- Player:** Software used by a person to listen to an audio file on a computer. **72**
- PlayStation 3, 505
- PlayStation 3 (Sony), 18
- Plotters:** Sophisticated printers that produce high-quality drawings such as blueprints, maps, and circuit diagrams using a row of charged wires (called styli) to draw an electrostatic pattern on specially coated paper and then fuse toner to the pattern. **216**, 225
- Plug and Play:** Technology that gives a computer the capability to configure adapter cards and other peripherals automatically as a user installs them. **276**
- Plug-in:** Program that extends the capability of a browser; often used to enhance multimedia. **73**, 84. *See also* **Add-on**
- Pocket hard drive:** Term that refers to smaller external hard disks because they enable users easily to transport photos and other files from one computer to another. **245**
- Podcast:** Recorded audio, usually an MP3 file, stored on a Web site that can be downloaded to a computer or a portable media player such as an iPod. **10**, 49, 51, **72**
- Pointer:** Small symbol displayed on a computer screen whose location and shape changes as a user moves a pointing device. **110**, **189**
- Pointing device:** Input device that allows a user to control a pointer on the screen. **189**  
types of, 189–192
- Pointing stick:** Pressure-sensitive pointing device shaped like a pencil eraser that is positioned between keys on a keyboard and moved by pushing the pointing stick with a finger. **192**
- Pop-up blocker:** Filtering program that stops pop-up ads from displaying on Web pages. **290**, 295
- Port:** Point at which a peripheral attaches to or communicates with a system unit so it can send data to or receive information from the computer. **170**  
Bluetooth, 172  
and LCD monitors, 209  
purchasing, 304  
types of, 170–173
- Port replicator:** External device that attaches to a mobile computer to provide connections to peripherals through ports built into the device. **173**
- Portable media player:** Mobile device on which you can store, organize, and play digital media. **17–18**  
buying guide, 310–311  
earbuds, 218  
and memory cards, 248  
most popular, 194  
storage of playlists, 369
- Portal:** Web site that offers a variety of Internet services from a single, convenient location. **67**, 84, **479–480**, 494
- POS terminal:** Terminal used by retail stores to record purchases, process credit or debit cards, and update inventory. **204**
- Possessed object:** Any item that a user must carry to gain access to a computer or computer facility. **391**, 410  
postage Web sites, 99
- Power supply:** Component of the system unit that converts wall outlet AC power to the DC power that is used by a computer. **157**, **175**
- Power user:** User who requires the capabilities of a workstation or other powerful computer, typically working with multimedia applications and using industry-specific software. **23**  
suggested input and output devices (fig.), 219  
suggested minimum configuration (fig.), 176  
typical storage devices (fig.), 259
- PowerBuilder:** Powerful program development tool developed by Sybase that is best suited for Web-based, .NET, and large-scale enterprise object-oriented applications. **443**
- powerline cable network, 336
- Preliminary investigation:** Investigation that determines the exact nature of a problem or improvement and decides whether it is worth pursuing. **425–427**, 456. *See also* **Feasibility study**
- Presentation software:** Application software that allows a user to create visual aids for presentations to communicate ideas, messages, and other information to a group. **117**, 134  
preventative maintenance of computers, 177  
preventing  
repetitive strain injuries (RSIs), 191  
virus infections, 288
- Primary key:** Field in a database that uniquely identifies each record in a file. **356**
- Principle of least privilege:** Policy adopted by some organizations, where users' access privileges are limited to the lowest level necessary to perform required tasks. **367**
- Print:** Placing the copy of a document on paper or some other medium. **114**  
print media, and wireless broadband connections, 318  
print servers, 325
- Printer:** Output device that produces text and graphics on a physical medium such as paper or transparency film. **5**, **211**, 225  
purchasing, 304  
types of, 211–217  
printing word processing documents, 114  
privacy  
computer issues, 7  
information, 402–407  
and Internet databases, 354  
laws (fig.), 406  
medical records access, 259  
and online mapping services, 129  
RFID tags, 416  
of social networking, 268
- Procedural language:** Type of programming language in which a programmer writes instructions that tell the computer what to accomplish and how to do it using a series of English-like words to write instructions. **438–439**, 456.  
*See also* **Third-generation language (3GL)**  
types of, 438–440  
processes, data and information, 4
- Processor:** Electronic component on a computer's motherboard that interprets and carries out the basic instructions that operate the computer. **6**, 40, 42, 43, 44, 45, 46, 47, **159**, 179, 180. *See also* **CPU (central processing unit)**  
and buses, 174  
comparisons of PC, 161  
purchasing, 304
- Product activation:** Process that attempts to prevent software piracy by requiring users to provide a software product's 25-character identification number in order to receive an installation identification number. **394**, 410  
product development as functional unit, 471
- Professional photo editing software:** Type of image editing software that allows photographers, videographers, engineers, scientists, and other high-volume digital photo users to edit and customize digital photos. **120**, **121**, 134  
profiles, electronic, 403
- Program:** Series of related instructions that tells a computer what task(s) to perform and how to perform them. **11**, 30. *See also* **Software**
- Program development:** Series of steps programmers use to build computer programs. **450**  
overview of, 450–454
- Program development life cycle:** Part of the implementation phase of the system development cycle that follows six steps: (1) analyze the requirements, (2) design the solution, (3) validate the design, (4) implement the design, (5) test the solution, and (6) document the solution. **432**, **450**, 457

**Program development tool:**

Program that provides a user-friendly environment for building programs. **436**, 455  
programming languages and, 436–449

**Programmer:** Person who writes and modifies computer programs. 13, 435, 456. *See also* **Developer**

**Programming language:** Set of words, abbreviations, and symbols that enables a programmer to communicate instructions to a computer. **435**, 456

classic (fig.), 444

and programming development tools, 435–449

**Programming team:** A group of programmers that may develop programs during the program development cycle. **451**

Progressive Casualty Insurance Company, 300

**Project leader:** Member of a project team who manages and controls the budget and schedule of the project. **420**

**Project management:** Process of planning, scheduling, and then controlling the activities during system development. **419–420**, 456

**Project management software:** Application software that allows a user to plan, schedule, track, and analyze the events, resources, and costs of a project. **118**, 134, **420**

**Project manager:** Member of a project team who controls the activities during system development. **420**

Project Natal, 54

**Project request:** Written, formal request for a new or modified system. **423–424**, 456

**Project team:** Group of people that consists of users, the systems analyst, and other IT professionals. **420**

proposals, soliciting and evaluating vendor, 429–430  
protocols described, 328

**Prototype:** Working model of a proposed system. **431**

proxy servers, 389

public switched telephone network (PSTN), 331

**Public-domain software:** Free software that has been donated for public use and has no copyright restrictions. **109**

publishing

computer applications in, 27  
Web, 74–75

purchasing

computer memory, 184–185

desktop computers, 302–306

hardware components, 303–304

notebook computers, 306–309

video cameras, 232

pyrotechnics software, 120

**Q**

**Quad-core processor:** Chip with four separate processor cores. **159**

**Quarantine:** Separate area of a hard disk that holds the infected file until a virus can be removed. **386**

**Query:** Request for specific data from a database. **364**

**Query by example (QBE):** DBMS feature that has a graphical user interface to assist users with retrieving data. **366**, 374

**Query language:** Language used with databases that consists of simple, English-like statements that allows users to specify the data to display, print, or store. **364**, 374

**Queue:** Lineup of multiple print jobs within a buffer. **276**

QuickTime file format, 73, 233, 236

**R**

**RAD:** Rapid application development; method of developing software in which a programmer writes and implements a program in segments instead of waiting until an entire program is completed. **440**, 443, 456

radio, broadcast and cellular, 341

**RAID:** Redundant array of independent disks. A group of two or more integrated disks that acts like a single large hard disk. **244**, 262, 397, 493

**RAID (redundant array of independent disks):** Group of two or more integrated hard disks that acts like a single large hard disk. 397, **486**, 488, 495

**RAM:** Type of memory that can be read from and written to by the processor and other devices. Programs and data are loaded into RAM from storage devices such as a hard disk and remain in RAM as long as the computer has continuous power. **164–167**, 180

and booting, 272

how program instructions transfer in, out, 165

purchasing, 304

types and configurations, 165–166

**Range check:** Validity check that determines whether a number is within a specified range. **360**, 374

**Reading:** Process of transferring data, instructions, and information from a storage medium into memory. **240**

**Read-only memory (ROM):**

Type of nonvolatile memory that is used to store permanent data and instructions. **167**, 180  
read/write heads, 242–243  
read/write storage media, 240–241

**Real time:** Describes users and the people with whom they are conversing being online at the same time. **78**

**Real time location system**

**(RTLS):** Safeguard used by some businesses to track and identify the location of high-risk or high-value items. **393**

RealPlayer, 73

recalculations by spreadsheets, 115

**Receiving device:** Device that accepts the transmission of data, instructions, or information. **314**, 344

**Record:** Group of related fields in a database. **356**, 374  
adding, changing, deleting, 357–359

recording, living digitally (feature), 504

recording videos, 232

recovering erased files, 284

recovery plans, 491

**Recovery utility:** DBMS feature that uses logs and/or backups to restore a database when it becomes damaged or destroyed. **367**, 374

recycling

of electronics, 14, 402

toner cartridges, 215

**Redundant components:**

Components used so that a functioning computer can take over automatically the tasks of a similar component that fails. **490**

**Reference software:** Application software that provides valuable and thorough information for all individuals. 21, 123, **127**, 135

**Relation:** Term used by developers of relational databases for file. **368**, 375

**Relational database:** Database that stores data in tables that consist of rows and columns, with each row having a primary key and each column having a unique name. **368–369**, 373, 375

**Relationship:** Link within data in a database. **368**, 375

**Removable hard disk:** Hard disk that can be inserted and removed from a drive. **244–245**, 262

**Repetition control structure:**

Type of control structure that enables a program to perform one or more actions repeatedly as long as a certain condition is met. **453**, 457

**Repetitive strain injury (RSI):**

Injury or disorder of the muscles, nerves, tendons, ligaments, and joints. 191, 192, **398**, 410

**Report generator:** DBMS feature that allows users to design a report on the screen, retrieve data into the report design, and then display or print the report. **366**, 374

report writers, 444–445

reports generated by MIS, 474–475

request for information (RFI), 428–430

request for proposal (RFP), 428–430

request for quotation (RFQ), 428–430

Research In Motion (RIM), 293

research Web sites, 93

**Resolution:** The number of horizontal and vertical pixels in a display device. **198**, 224  
of liquid crystal displays, 209  
of nonimpact printers, 213

- Resources:** Hardware, software, data, and information shared using a network. **8**
- Restore:** To copy backed up files by copying them to their original location on the computer. **396**
- Restore utility:** Program that reverses the backup process and returns backed up files to their original form. **286, 295**
- Rexx:** Restructured Extended Executor. Procedural interpreted scripting language for both professional programmers and nontechnical users. **448**
- RFI (request for information), 428–430
- RFID:** Short for radio frequency identification; standard, specifically a protocol, that defines how a network uses radio signals to communicate with a tag placed in or attached to an object, an animal, or a person. **201, 330, 416**
- RFID reader:** Reading device that reads information on an RFID tag via radio waves. **188, 201, 224**
- RFID tags, 48, 416
- RFP (request for proposal), 428–430
- RFQ (request for quotation), 428–430
- Rhapsody media player, 290
- RIAA (Recording Industry Association of America), 47
- Ring network:** Type of network topology in which a cable forms a closed loop (ring) with all computers and devices arranged along the ring. **328**
- Ripping:** Process of copying audio and/or video data from a purchased disc and saving it on digital media. **255**
- Ritchie, Dennis, 439
- Rock and Roll Hall of Fame and Museum, 92
- Rootkit:** Program that hides in a computer and allows someone from a remote location to take full control of the computer. **384, 410**
- Router:** Communications device that connects multiple computers or other routers together and transmits data to its correct destination on a network. **335**
- Row:** Term used by users of relational databases for record. **368, 375**
- RSS 2.0:** Really Simple Syndication. Specification that content aggregators use to distribute content to subscribers. **70, 447**
- RSS Aggregator software, 130
- Ruby on Rails:** Open source framework that provides technologies for developing object-oriented, database-driven Web sites. **448, 456**
- Run:** Process of using software. **12**
- Russo, Patricia, 343
- S**
- safeguards
- against botnets, DoS attacks, back doors, spoofing, 388–389
  - against computer-caused health problems, 398–399
  - for data and personal information, 402–407
  - against hardware theft, vandalism, 393
  - against information theft, 395
  - against software theft, 393–394
  - against system failure, 396
  - against unauthorized access and use, 389–392
  - against viruses, malware, 385–387
- safety
- computer issues, 7
  - and online mapping services, 129
- Sales force automation (SFA):** Software that equips traveling salespeople with the electronic tools they need to be more productive. **472, 494**
- Sarbanes-Oxley Act, 488
- SAS:** Serial-attached SCSI; newer type of SCSI that transmits at much faster speeds than parallel SCSI. **172**
- SAS (serial-attached SCSI), 246
- SATA (Serial Advanced Technology Attachment), 246
- satellite broadband transmission, 338
- Satellite Internet service:** Provides high-speed Internet connections via satellite to a satellite dish that communicates with a satellite modem. **58, 84**
- satellites, GPS, 320
- Save:** To transfer a document from a computer's memory to a storage medium. **114**
- files in application software, 138
- Scalability:** Measure of how well computer hardware, software, or an information system can grow to meeting increasing performance demands. **490**
- Scanner:** Light-sending input device that reads printed text and graphics and then translates the results into a form the computer can process. **5, 189, 200, 224**
- purchasing, 304
- types of, 200–202
- schools
- computer applications in education, 24–25
  - processing of new student data into information, 352–353
  - technology provided to students, teachers, 166
- science
- computer applications in, 26
  - Web sites for, 103
- Scope:** The goal, required activities, time estimates for each activity, cost estimates for each activity, order of activities, and activities that can take place at the same time during system development. **420**
- Screen saver:** Utility program that causes a display device's screen to show a moving image or blank screen if no mouse activity occurs for a specified time. **287, 295**
- Script kiddie:** Someone who accesses a computer or network illegal with the intent of destroying data, stealing information, or other malicious action but does not have the technical skills and knowledge. **382**
- Scripting language:** Interpreted language that typically is easy to learn and use. **447**
- Scripting New Web site, 380
- scripts, 447
- SCSI interfaces, 246
- SCSI port:** Special high-speed parallel port to which peripherals, such as disk drives and printers, can be attached. **172, 181**
- Seagate Technology, 261
- Search engine:** Program that finds Web sites, Web pages, images, videos, news, and other information related to a specific topic. **65, 84**
- asterisk (\*) wildcard, 67
- for research, 93
- using, 66–67
- Search text:** Word or phrase entered in a search engine's text box that describes the item you want to find. **66, 84**
- search tools (fig.), 65
- Search utility:** Program that attempts to locate a file on your computer based on criteria you specify. **285, 295**
- searching
- the Web, 65–75
  - Web for driving directions, addresses, phone numbers, 88–89
- Secondary storage:** The physical material on which a computer keeps data, instructions, and information. **239**
- Secure Digital (SD):** Memory card that is capable of storing between 512 MB and 8 GB of data. **248, 249, 262**
- Secure Digital High Capacity (SDHC):** Memory card that is capable of storing between 4 and 32 GB of data. **248, 249, 262**
- Secure site:** Web site that uses encryption techniques to secure its data. **395**
- security
- administering, 278
  - of cloud storage, 252
  - computer security risks, 382–383
  - data, 367
  - database breaches, 370
  - hardware theft, vandalism, 393–394
  - information privacy, 402–407
  - information theft, 395–396
  - macro threats, responsibility for, 445
  - national and local, 408
  - phase of systems development, 434–435
  - preventing virus infections, 288
  - selecting good passwords, 278
  - system failure, 396–397
  - trustworthiness of online purchasing, 485
  - unauthorized access and use, 389–392
  - wireless, 397



**Selection control structure:**

Type of control structure that tells the program which action to take, based on a certain condition. **452, 457**

selective backups, 397, 490

Semantic Web, 61

sending e-mail using Outlook, 76

**Sending device:** Device that initiates instructions to transmit data, instructions, or information. **314, 344**

**Sequence control structure:**

Type of control structure that shows one or more actions following each other in order. **452, 457**

serial port, 171

servlets, 447

**Server:** Computer that controls access to the hardware, software, and other resources on a network and provides a centralized storage area for programs, data, and information. **19, 30, 325**

backing up files on offsite

Internet, 414–415

blade, 489

virtualization, 483

**Server operating system:**

Operating system that organizes and coordinates how multiple users access and share resources on a network. **277–278, 294**

types of, 282–283

**Service pack:** Free downloadable software updates provided by the software manufacturer to users who have registered and/or activated their software. **277**

service-oriented architecture (SOA), 482

set-top boxes, 506

**SharePoint Designer:** Web page authoring program that is part of the Microsoft Office and SharePoint families of products. **449, 456**

**Shareware:** Copyrighted software that is distributed at no cost for a trial period. **109**

**Shopping cart:** Element of an electronic storefront that allows a customer to collect purchases. **75**

sharing content, personal and business perspectives on, 152–153

Shockley, William, 37

Shockwave Player, 73

shopping cart, 75

shopping Web sites, 100

Shugart, Alan, 39, 261

**Signature capture pad:** Pen input device that captures handwritten signatures with a stylus or pen that is attached to the device. **194, 224**

signature verification systems, 203

Silverlight, 73

Simple Query Wizard, using, 365

**Sleep mode:** Operating system function that saves any open documents and programs to RAM, turns off all unneeded functions, and then places the computer in a low-power state. **272**

Slingbox, 503

**Small- and medium-sized**

**business (SMB):** Business that is smaller in size than an enterprise and typically does not have an international presence. **465**

**Small office/home office**

**(SOHO):** Describes any company with fewer than 50 employees, as well as the self-employed who work from home. **22**

peer-to-peer networks, 325

suggested input and output devices (fig.), 219

suggested minimum configuration (fig.), 176

typical storage devices (fig.), 259

SMART Board, 218

**Smart card:** Card, similar in size to a credit card or ATM card, that stores data on a thin microprocessor embedded in the card. **257, 263**

**Smart phone:** Internet-enabled telephone that usually also provides personal information management functions. **17, 22, 52, 293**

buying guide, 309–310

digital video-enabled, 231

and GPS, 320

input for, 194–195

and memory cards, 248

modem, 334

operating systems for, 283

and printers, 212

Smartlane, 402

SMS (short message service), 317

**Social engineering:** Gaining unauthorized access or obtaining confidential information by taking advantage of the trusting human nature of some victims and the naivety of others. **405, 411**

**Social networking Web site:**

Web site that encourages members in its online community to share their interests, ideas, stories, photos, music, and videos with other registered users. **10, 54, 69, 84. See also Online social network**

effect on Internet traffic, 73

privacy and, 268

Softbank, 133

**Software:** Series of related instructions that tells a computer what task(s) to perform and how to perform them. **11, 30. See also Program**

communications, 330–331

development, 13

open source, 45

piracy, 393, 401

**Software suite:** Collection of individual programs available together as a unit. Business software suites typically include word processing, spreadsheet, e-mail, and presentation graphics software. **118, 134**

**Software theft:** Computer security risk that occurs when someone (1) steals software media, (2) intentionally erases programs, (3) illegally copies a program, or (4) illegally registers and/or activates a program. **383, 393, 410**

safeguards against, 393–394

**Solid state drive (SSD):** Storage device that typically uses flash memory to store data, instructions, and information. **52, 239, 247**

**Solid state media:** Term used to refer to components that consist entirely of electronic components, such as integrated circuits, and contain no moving parts. **247, 262**

Sony game consoles, 18

Sony PlayStation 3, 50, 505

Sony PlayStation Portable (PSP), 48

Sony PSPgo, 53

**Sound card:** Adapter card that enhances the sound generating capabilities of a personal computer by allowing sound to be input through a microphone and output through external speakers or headset. **157, 169, 180, 198**

purchasing, 304

**Source program:** Program that contains the language instructions, or code, to be converted to machine language. **437**

space exploration and computers, 222

Spafford, Gene, 409

**Spam:** Unsolicited e-mail message or newsgroups posting sent to many recipients or newsgroups at once. **289, 295, 404–405, 411**

**Speakers:** Audio output devices that generate sound. **5, 217, 225**

purchasing, 304

**Speech recognition:** Computer's capability of distinguishing spoken words. **198. See also Voice recognition**

speed of various Internet connections (fig.), 332

spelling checkers, 114

spim, spit, 49

**Spoofing:** Technique intruders use to make their network or Internet transmission appear legitimate to a victim computer or network. **388, 410**

safeguards against, 388–389

**Spooling:** Operating system process that sends documents to be printed to a buffer instead of sending them immediately to the printer. The buffer then holds the information waiting to print while the printer prints from the buffer at its own rate of speed. **275–276**

sports, computer use in, 178

sports Web sites, 101

**Spreadsheet software:** Application software that allows a user to organize data in rows and columns and to perform calculations on the data. **115, 134**

features and uses of, 115–116

**Spyware:** Program placed on a computer without the user's knowledge that secretly collects information about the user. **49, 289, 385, 404, 411**

- Spyware remover:** Program that detects and deletes spyware and similar programs on a user's computer. **289, 295**
- SQL:** Query language that allows users to manage, update, and retrieve data in a relational DBMS. **364, 443, 456**
- Stallman, Richard, **409**
- Stand-alone operating system:** Complete operating system that works on a desktop computer, notebook computer, or mobile computing device and that also works in conjunction with a network operating system. **280**
- Standards:** Sets of rules and procedures an organization expects employees to accept and follow. **419**
- Star network:** Type of network topology in which all computers and devices on the network connect to a central device, thus forming a star. **326–327**
- Start button, **110**
- starting Windows programs, **111**
- Steering committee:** Decision-making body in a company. **420**
- stock market Web sites, **98**
- storage  
cloud, **251–252**  
enterprise, **258–259, 487–488**  
flash memory storage, **246–250**  
hard disks, **240–246**  
magnetic strip cards, smart cards, **257**  
microfilm, microfiche, **258**  
overview, **238–240**  
Rosetta Project, **258**  
tape, **257**  
terminology, **240**  
virtualization, **483**
- Storage area network (SAN):** High-speed network with the sole purpose of providing storage to other servers to which it is attached. **486–487, 495**
- Storage device:** Hardware used to record (write and/or read) items to and from storage media. **6, 30, 240**  
and the processor, **159**  
for users by category (fig.), **259**
- Storage media:** The physical material on which a computer keeps data, instructions, and information. **6, 30**
- Storage medium:** The physical material on which a computer keeps data, instructions, and information. **239**
- Stoustrup, Bjarne, **441**
- Streaming:** Process of transferring data in a continuous and even flow. **72**  
video, **503**
- Structured Query Language (SQL):** Query language used with databases that allows users to manage, update, and retrieve data. **369, 375**  
studio cameras, **197**
- Stylus:** Small metal or plastic device that looks like a ball-point pen, but uses pressure instead of ink to write, draw, or make selections. **189, 194, 195**  
for PDA, **17**
- Subject directory:** Search tool that classifies Web pages in an organized set of categories and subcategories. **65, 67**
- Subscribe:** Process of a user adding his or her e-mail name and address to a mailing list. **78**
- Sun Microsystems, **44, 373, 455, 479**
- Supercomputer:** Fastest, most powerful, and most expensive computer, capable of processing more than 135 trillion instructions in a single second. **15, 19, 30, 50**
- Surfing the Web:** Activity of using links to explore the Web. **64**
- Surge protector:** Device that uses special electrical components to smooth out minor noise, provide a stable current flow, and keep an overvoltage from reaching the computer and other electronic equipment. **396, 410**
- S-video, **233**
- Sybase, **373**
- Symantec, **409**
- Symbian OS, **283**
- symbolic addresses, **437**
- System:** Set of components that interact to achieve a common goal. **418, 456**
- System bus:** Bus that is part of the motherboard and connects the processor to main memory. **174, 181. See also Front side bus**
- System clock:** Small quartz crystal circuit that is used by the processor to control the timing of all computer operations. **160, 161**
- System developer:** Person responsible for designing and developing an information system. **420. See also Systems analyst**
- System development:** Set of activities used to build an information system, including planning, analysis, design, implementation, and support. **418, 456**  
conducting effective interviews, **460–461**  
overview, **418–435**
- System development life cycle (SDLC):** Collection of phases in system development. **418**
- System failure:** Prolonged malfunction of a computer. **382, 396, 410**
- System proposal:** Document that assesses the feasibility of each alternative solution and then recommends the most feasible solution for a project. **427**
- System software:** Programs that control or maintain the operations of a computer and its devices. **11, 30, 109, 270, 294**
- System unit:** Case that contains the electronic components of a computer that are used to process data. **5, 6, 30, 156, 180**  
components of, **156–158**  
ports on, **170**
- Systems analyst:** Person responsible for designing and developing an information system. **419–420. See also System developer**  
building relationships with users, **422**
- Systems mailing list, **493**
- ## T
- T1 line:** The most popular T-carrier line. **332**
- Tabbed browsing:** Web browser feature where the top of the browser displays a tab (similar to a file folder tab) for each Web page you open. **64**
- Table:** Term used by users of relational databases for file. **368, 375**
- Tablet PC:** Special type of notebook computer that you can interact with by touching the screen with your finger or a digital pen. **16, 22, 47, 156, 308, 309**
- Tape:** Magnetically coated ribbon of plastic capable of storing large amounts of data and information at a low cost. **257, 263**
- Tape drive:** Device used to read and write data and information on tape. **257, 263**
- tasks, coordinating, **275–276**
- Tax preparation software:** Application software that is used to guide individuals, families, or small businesses through the process of filing federal taxes. **123, 125, 134**
- taxes Web sites, **98**
- taxing media downloads, **291**
- T-carrier line:** Any of several types of long-distance digital telephone lines that carry multiple signals over a single communications line. **332, 344**
- Tcl:** Tool Command Language; interpreted scripting language maintained by Sun Microsystems Laboratories. **448**
- TCP/IP:** Short for Transmission Control Protocol/Internet Protocol; network standard, specifically a protocol, that defines how messages (data) are routed from one end of a network to the other, ensuring the data arrives correctly. **329**
- Telecommuting:** Work arrangement in which employees work away from a company's standard workplace and often communicate with the office through the computer. **24**
- Telemedicine:** Form of long-distance health care where health-care professionals in separate locations conduct live conferences on the computer. **26, 46**
- Telesurgery:** Surgery in which a surgeon performs an operation on a patient who is not located in the same physical room as the surgeon. **26**
- telesurgery, **26**
- television, **231**
- tendonitis, **398**

- Terabyte (TB):** Approximately one trillion bytes. **164**
- Terminal:** Computer, usually with limited processing power, that enables users to send data to and/or receive information from a host computer. **204–205**
- Text message:** Short note, typically fewer than 300 characters, sent to or from a smart phone or other mobile device. **17**
- personal and business perspectives on, **144–145**
- privacy of employee, **407**
- and typing skills, **130**
- Text messaging:** Service that allows users to send and receive short text messages, typically fewer than 300 characters, on a phone or other mobile device. **317, 344**
- Thermal printer:** Type of non-impact printer that generates images by pushing electrically heated pins against heat-sensitive paper. **215–216, 225**
- Third-generation language (3GL):** Type of programming language in which a programmer writes instructions that tell the computer what to accomplish and how to do it using a series of English-like words to write instructions. **438, 456.**
- See also **Procedural language**
- thrashing, **275**
- Thumbnail:** Small version of a larger graphic. **71**
- Title bar:** Horizontal space, located at the top of a window, that contains the window's name. **110**
- Token ring:** Network standard in which computers and devices on the network share or pass a special signal, called a token, in a unidirectional manner and in a preset order. **329**
- Toner:** Type of powdered ink that is used by some laser printers and copy machines to produce output. **214**
- recycling cartridges, **215**
- tongue-controlled joysticks, **221**
- ToolBook, **449**
- Top-level domain (TLD):** Identifies the type of organization associated with the domain. **60**
- Torvalds, Linus, **43, 293**
- Touch screen:** Touch-sensitive display device with which users interact by touching areas of the screen. **188, 193, 224**
- Touchpad:** Small, flat, rectangular pointing device that is sensitive to pressure and motion. **192**
- Touch-sensitive pad:** Input device that enables users to scroll through and play music, view pictures, watch videos or movies, adjust volume, and/or customize settings. **188, 193, 224**
- Trackball:** Stationary pointing device with a ball on its top or side. **192**
- Training:** Showing users exactly how they will use new hardware and software in a system. **433**
- Transaction processing system (TPS):** Information system that captures and processes data from day-to-day business activities. **473–474, 494**
- transferring videos to computers, **228–229, 232–233**
- transistor, **37**
- Transmission media:** Materials or substances capable of carrying one or more signals in a communications channel. **338, 345**
- physical, **339–340**
- wireless, **340–341**
- transportation
- computer applications in, **28**
- computer usage in, **492**
- Transportation Security Administration screening, **250**
- travel
- computer applications in, **27, 28**
- e-commerce examples, **484**
- Web sites for, **96, 482**
- Travel and mapping software:** Application software that enables users to view maps, determine route directions, and locate points of interest. **123, 127, 135**
- Trojan horse:** Malicious-logic program named after the Greek myth that hides within or looks like a legitimate program. **288, 384, 410**
- TrueType fonts, **42**
- Trusted source:** Company or person a user believes will not send a virus-infected file knowingly. **385, 410**
- Tuple:** Term used by developers of relational databases for record. **368, 375**
- Turnaround document:** Document that a user returns to the company that has created and sent it. **200**
- Turning, Alan, **37**
- Twisted-pair cable:** Transmission media that consists of one or more twisted-pair wires bundled together. **339, 345**
- U**
- Ultra-Mobile PC (UMPC):** Computer small enough to fit in one hand. **17.** See also **Handheld computer**
- Ultra-wideband (UWB):** Network standard that specifies how two UWB devices use short-range radio waves to communicate at high speeds with each other. **330**
- UMD:** Universal Media Disc; mini-DVD used specifically with the PlayStation Portable handheld game console. **256**
- Unauthorized access:** Use of a computer or network without permission. **383, 389–392, 410**
- Unauthorized use:** Use of a computer or its data for unapproved or possibly illegal activities. **383, 389–392, 410**
- Uncompress:** To restore a compressed, or zipped, file to its original form. **290**
- Uninstaller:** Utility program that removes a program, as well as any associated entries in the system files. **285**
- Uninterruptible power supply (UPS):** Device that contains surge protection circuits and one or more batteries that can provide power during a temporary or permanent loss of power. **396, 410**
- UNIVAC computer, **37**
- UNIX:** Multitasking operating system that now is available for most computers of all sizes. **281, 294**
- Unsubscribe:** Process of a user removing his or her e-mail name and address from a mailing list. **78**
- updates, automatic, **277**
- updating Windows, **298–299**
- Uploading:** Process of transferring documents, graphics, and other objects from a computer to a server on the Internet. **80**
- URL:** Uniform Resource Locator; unique address for a Web page. **63.** See also **Web address**
- U.S. Department of Homeland Security, **25, 392, 408**
- U.S. Government Web sites, **99**
- U.S. Robotics, **44**
- USAJOBS Web site, **105**
- USB flash drive:** Flash memory storage device that plugs in a USB port on a computer or portable device. **5, 6, 48, 170, 239, 250, 262**
- USB hub:** Device that plugs in a USB port on the system unit and contains multiple USB ports in which cables from USB devices can be plugged. **172, 304**
- USB port:** Port that can connect up to 127 different peripherals with a single connector type. **171, 181**
- User:** Anyone who communicates with a computer or utilizes the information it generates.
- 7, 30**
- employee as, **372**
- Internet, **9–10**
- levels in the enterprise, **467–468**
- log on, **278**
- system analysts building relationships with, **422**
- User ID:** Unique combination of characters, such as letters of the alphabet and/or numbers, that identifies a specific user. **278.** See also **User name**
- User interface:** The portion of software that defines how a user interacts with a computer, including how the user enters data and instructions and how information is displayed on the screen. **272, 294**
- User name:** Unique combination of characters, such as letters of the alphabet and/or numbers, that identifies a specific user. **34–35, 77, 278, 390, 410.** See also **User ID**
- Users:** Anyone for whom the system is being built. **419**



**Utility:** Type of system software that allows a user to perform maintenance-type tasks, usually related to managing a computer, its devices, or its programs. **284, 294**

**Utility program:** Type of system software that allows a user to perform maintenance-type tasks usually related to managing a computer, its devices, or its programs. **12, 30, 284, 294** overview of, **110** types of, **284–291**

**UWB (ultra-wideband):**

Network standard that specifies how two UWB devices use short-range radio waves to communicate at high speeds with each other. **330**

## V

validating

baseball memorabilia, **359**  
data, **359–360**

**Validation:** Process of comparing data with a set of rules or values to find out if the data is correct. **359–360, 374**

**Value-added network (VAN):**

Third-party business that provides networking services such as secure data and information transfer, storage, e-mail, and management reports. **322**

**Value-added reseller (VAR):**

Company that purchases products from manufacturers and then resells these products to the public — offering additional services with the product. **429**

**VBScript:** Visual Basic, Scripting Edition; subset of the Visual Basic language that allows programmers to add intelligence and interactivity to Web pages. **448**

vendors, soliciting proposals from, **429–430**

VeriSign, **293**

Verizon, **343**

Versatile Multilayer Disc (HD VMD), **256**

vertical market software, **427**

**Video:** Images displayed in motion. **73, 84**  
content viewed on display devices, **210**  
creating, uploading to YouTube, **228–229**

digital technology, **231–236**

living digitally (feature), **503**

uploading to YouTube, **236**

**Video blog:** A blog that contains video clips. **51, 68**

**Video card:** Adapter card that converts computer output into a video signal that travels through a cable to the monitor, which displays an image on the screen. **157, 169, 180, 304. See also Graphics card**

**Video conference:** Meeting between two or more geographically separated people who use a network or the Internet to transmit audio and video data. **199, 224, 316** software, **130**

**Video editing software:**

Application software that allows a user to modify a segment of video, called a clip. **120, 122, 134, 504**

**Video input:** Process of capturing full-motion images and storing them on a computer's storage medium. **199, 224**

**Video message:** Short video clip, usually about 30 seconds, sent to or from a smart phone or other mobile device. **17, 130, 317**

**Video messaging:** Wireless messaging service that allows users to send short video clips. **318, 344**

**Video phone:** Phone that can send video messages. **17**

**Video telephone call:** Telephone call made using a PC video camera that allows both parties to see each other as they communicate over the Internet. **199**

**Virtual memory:** A portion of a storage medium, usually the hard disk, that the operating system allocates to function as additional RAM. **275, 294**

**Virtual private network (VPN):** Network that provides a mobile user with a secure connection to a company network server, as if the user has a private line. **482–483, 494**

**Virtual reality (VR):** Computers used to simulate a real or imagined environment that appears as a three dimensional (3-D) space. **73, 84**

virtualization, **54, 483–485**

**Virus:** Potentially damaging computer program that affects, or infects, a computer negatively by altering the way the computer works without the user's knowledge or permission. **49, 288, 384, 410**

Elk Cloner, **40**

e-mail, **77**

safeguards against, **385–387**

spreading through e-mail, **385**

**Virus definition:** Known specific pattern of virus code. **386. See also Virus signature**

**Virus hoax:** E-mail message that warns users of a nonexistent virus or other malware. **387, 410**

**Virus signature:** Known specific pattern of virus code. **386. See also Virus definition**

VisiCalc, **40**

Visual Basic, **442**

Visual C#, **442–443**

Visual C++, **442–443**

**Visual programming**

**environment (VPE):**

Graphical interface in a visual programming language that allows programmers to drag and drop objects to develop programs. **443**

**Visual programming language:**

Programming language that provides a visual or graphical interface for creating source code. **443**

**Visual Studio:** Suite of program development tools from Microsoft that assists programmers in building programs for Windows, Windows Mobile, or operating systems that support Microsoft's .NET framework. **49, 441–442, 456**

**Visual voice mail:** Voice mail feature that allows users to view message details such as the length of calls and, in some cases, read message contents instead of listening to them. **322**

**Vlog:** Short for video blog. **51, 68**

**Vlogosphere:** All vlogs worldwide. **68**

**Voice input:** Process of entering data by speaking into a microphone. **198, 218**

**Voice mail:** Service that functions much like an answering machine, allowing a user to leave a voice message for one or more people. **322, 344**

**Voice output:** Audio output that occurs when a user hears a person's voice or when a computer talks to the user through the speakers on the computer. **218**

**Voice recognition:** Computer's capability of distinguishing spoken words. **198, 225. See also Speech recognition** voice verification systems, **203**

**VoIP:** Voice over IP, or Internet Protocol; technology that allows users to speak to other users over the Internet (instead of the public switched telephone network). **51, 56, 80, 198, 316, 480**

**Volatile memory:** Type of memory that loses its contents when a computer's power is turned off. **164, 180**

von Neumann, John, **37**

VPN tunnel, **482**

VR. *See* virtual reality

## W

**War driving:** Intrusion technique in which an individual attempts to detect wireless networks via their notebook computer or mobile device while driving a vehicle through areas they suspect have a wireless network. **397**

**Warm boot:** Process of using the operating system to restart a computer. **272**

warranties, extended, **306**

weather, and computer usage, **260**

Weather Channel Web site, **101**  
weather Web sites, **101**

**Web:** Worldwide collection of electronic documents called Web pages, the Web is one of the more popular services on the Internet. **10, 30, 316. See also World Wide Web (WWW)**

browsing, **61–62**

making use of, **91**

multimedia on, **70**

searching the, **65–67**

surfing the, **64**



- Web 2.0:** Term used to refer to Web sites that provide a means for users to share personal information, allow users to modify Web site content, and have application software built into the site for visitors to use. **10, 50, 61, 261, 316**
- Web 3.0, **61**
- Web address:** Unique address for a Web page. **63, 84. See also URL (Uniform Resource Locator)**
- Web app:** Web site that allows users to access and interact with software from any computer or device that is connected to the Internet. **69, 84, 128, 135. See also Web application**
- Web application:** Web site that allows users to access and interact with software from any computer or device that is connected to the Internet. **10, 69, 84, 108, 135. See also Web app**
- mashup, **322**
- popular (fig.), **129**
- Web browser:** Application software that allows users to access and view Web pages. **61, 84. See also Browser**
- displaying home page, **62**
- most popular, **61**
- Web browser software, **130**
- Web cam:** Type of digital video camera that enables a home or small business user to capture video and still images, send e-mail messages with video attachments, add live images to instant messages, broadcast live images over the Internet, and make video telephone calls. **5, 189, 199, 224. See also PC video camera**
- purchasing, **304**
- Web sites for, **92**
- Web conference:** Online meeting that takes place on the Web. **321**
- personal and business perspectives on, **150–151**
- Web databases, **370–371**
- Web developer:** Employee who analyzes, designs, implements, and supports Web applications; works with HTML, Ajax, JavaScript, and multimedia. **446, 456**
- Web filtering software:** Program that restricts access to certain material on the Web. **290, 295, 407**
- Web page:** Electronic document on the Web, which can contain text, graphics, audio, and video and often has built-in connections to other documents, graphics, Web pages, or Web sites. **10, 61, 84**
- bookmarks, favorites, **63**
- development programs, **446–449**
- navigating, **64**
- secure, **395**
- Web page authoring software:** Software used to create Web pages that include graphical images, video, audio, animation, and other special effects with interactive content. **74, 120, 122, 134, 449, 456**
- Web publishing:** Development and maintenance of Web pages. **74**
- Web server:** Computer that delivers requested Web pages to a computer. **61, 325**
- Web services:** Set of software technologies that allows businesses to create products and B2B (business-to-business) interactions over the Internet. **322, 344, 481–482, 494**
- Web site:** Collection of related Web pages and associated items, such as documents and pictures, stored on a Web server. **10, 61**
- accessibility levels for physically challenged users, **220**
- and cookies, **403–404**
- evaluating, **70**
- most popular, **11, 59**
- scalability, **490**
- secure, **395**
- types of, **67–70, 91–106**
- vulnerability of financial, **435**
- Web-based training (WBT):** Computer-based training that uses Internet technology and consists of application software on the Web. **131, 135, 449**
- webcast, **232**
- Webopedia Web site, **93**
- Wheel:** Steering-wheel-type input device that is used to simulate driving a vehicle. **196, 224, 303**
- Wide area network (WAN):** Network that covers a large geographic area (such as a city, country, or the world) using a communications channel that combines many types of media such as telephone lines, cables, and radio waves. **324, 344**
- Widescreen:** Term used to refer to LCD monitors that are wider than they are tall. **208**
- Wi-Fi:** Term for any network based on the 802.11 series of standards. **57, 84, 329, 340**
- Wi-Fi Protected Access:** Security standard that improves on older security standards by authenticating network users and providing more advanced encryption techniques. **397, 410**
- Wii (Nintendo), **18, 50, 505**
- Wii Remote:** Motion-sensing input device that uses Bluetooth wireless technology to communicate with the Wii game console. **197, 224**
- Wiki:** Collaborative Web site that allows users to create, add to, modify, or delete the Web site content via their Web browser. **68, 84, 316**
- personal and business perspectives on, **148–149**
- reliability for research, **68**
- Wikipedia, **46**
- WiMAX:** Worldwide Interoperability for Microwave Access; newer network standard developed by IEEE that specifies how wireless devices communicate over the air in a wide area. **318, 330. See also 802.16**
- Window:** Rectangular area of a computer screen that displays data or information. **110, 134**
- Windows
- connecting to network using, **276**
- keeping up to date, **298–299**
- OS with most market share, **279**
- starting, interacting with program, **111**
- Windows 7:** Microsoft's fastest, most efficient operating system to date, offering quicker program start up, built-in diagnostics, automatic recovery, improved security, enhanced searching and organizing capabilities, and an easy-to-use interface. **280**
- sample expert system in, **476**
- Windows Aero:** Windows interface used by computers with more than 1 GB of RAM. **273**
- Windows Disk Defragmenter, **286**
- Windows Embedded CE, **283**
- Windows Live Movie Maker, **274**
- Windows Media Player, **72, 73, 274, 369**
- Windows Mobile operating system, **283**
- Windows Photo Viewer, **285**
- Windows ReadyBoost:** Windows feature that can increase the size of memory by allocating available storage space on removable flash memory devices as additional memory cache. **275**
- Winer, Dave, **380**
- wiping utilities, **241**
- wireless
- access points, **397**
- home network, setting up, **336–337**
- instant messaging (IM), **318**
- messaging services, **317**
- in notebook computers, **308**
- security, **397**
- transmission media, **340–341**
- Wireless access point:** Central communications device that allows computers and devices to transfer data wirelessly among themselves or to transfer data wirelessly to a wired network. **318–319, 335, 345, 397, 410, 506**
- Wireless Application Protocol (WAP):** Network standard, specifically a protocol, that specifies how some wireless mobile devices such as smart phones can display the content of Internet services such as the Web, e-mail, and chat rooms. **330**
- wireless broadband, and decline of print media, **318**
- wireless chumby, **506**
- Wireless Internet access point:** Location where people can connect wirelessly to the Internet using notebook computers, smart phones, handheld game consoles, or other devices. **318, 344**

**Wireless Internet service**

**provider:** Type of Internet service provider that provides wireless Internet access to computers and mobile devices, such as smart phones and PDAs, with built-in wireless capability or to computers with wireless modems or wireless access devices. **58, 84**

**Wireless LAN (WLAN):** Local area network that uses no physical wires. **323, 344**

**Wireless modem:** Modem that allows access to the Web wirelessly from a notebook computer, PDA, smart phone, or other mobile device. **334, 345**

**WML:** Wireless markup language; subset of XML that allows Web developers to design pages specifically for microbrowsers. **447, 456**

**Word processing software:** One of the more widely used types of application software; allows a user to create and manipulate documents containing mostly

text and sometimes graphics.

Sometimes called a word processor. **39, 113, 134**

overview of, **113–114**

wordwrap feature, **113**

**Workflow:** Defined process that identifies the specific set of steps involved in completing a particular project or business process. **482**

**Workflow application:** Program that assists in the management and tracking of all the activities in a business process from start to finish. **482, 494**

workgroup computing, **321**

**Worksheet:** Rows and columns used to organize data in a spreadsheet. **115**

**World Wide Web (WWW):** Worldwide collection of electronic documents called Web pages, the Web is one of the more popular services on the Internet. **10, 42, 61. See also Web**

World Wide Web Consortium (W3C), **42, 57, 220**

**Worm:** Program that copies itself repeatedly, using up system resources and possibly shutting down the system. **288, 384, 409, 410**

**Writing:** Process of transferring data, instructions, and information from memory to a storage medium. **240**

**X**

Xbox (Microsoft), **18, 49, 505**

**xD Picture Card:** Type of miniature mobile storage media that is a flash memory card capable of storing between 256 MB and 2 GB of data. **248, 249, 262**

Xerox, **223**

Xerox PARC, **40**

**XHTML:** Extensible HTML; markup language that enables Web sites to be displayed more easily on microbrowsers in smart phones and other personal mobile devices. **446, 456**

**XML:** Extensible Markup Language; format for sharing data that allows Web developers

to create customized tags, as well as use predefined tags. **446, 456**

**Y**

Y2K compliance, **45**

Yahoo!, **11, 43**

Yellow Pages Local Directory, **88**

Your Life, Calculated Web site, **439**

Yourdon, Ed, **455**

YouTube, **49, 51, 69, 73, 83, 95, 234, 493, 504**

making videos and uploading to, **228–229**

**Z**

Zappacosta, Pierluigi, **223**

**Zippered files:** Type of compressed files that usually have a .zip extension. **138–139, 290**

zipping (compressing) files, **138–139**

**Zombie:** Compromised computer whose owner is unaware the computer is being controlled remotely by an outsider. **387**

ZoneAlarm (CheckPoint), **287**

Zuckerberg, Mark, **83**

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